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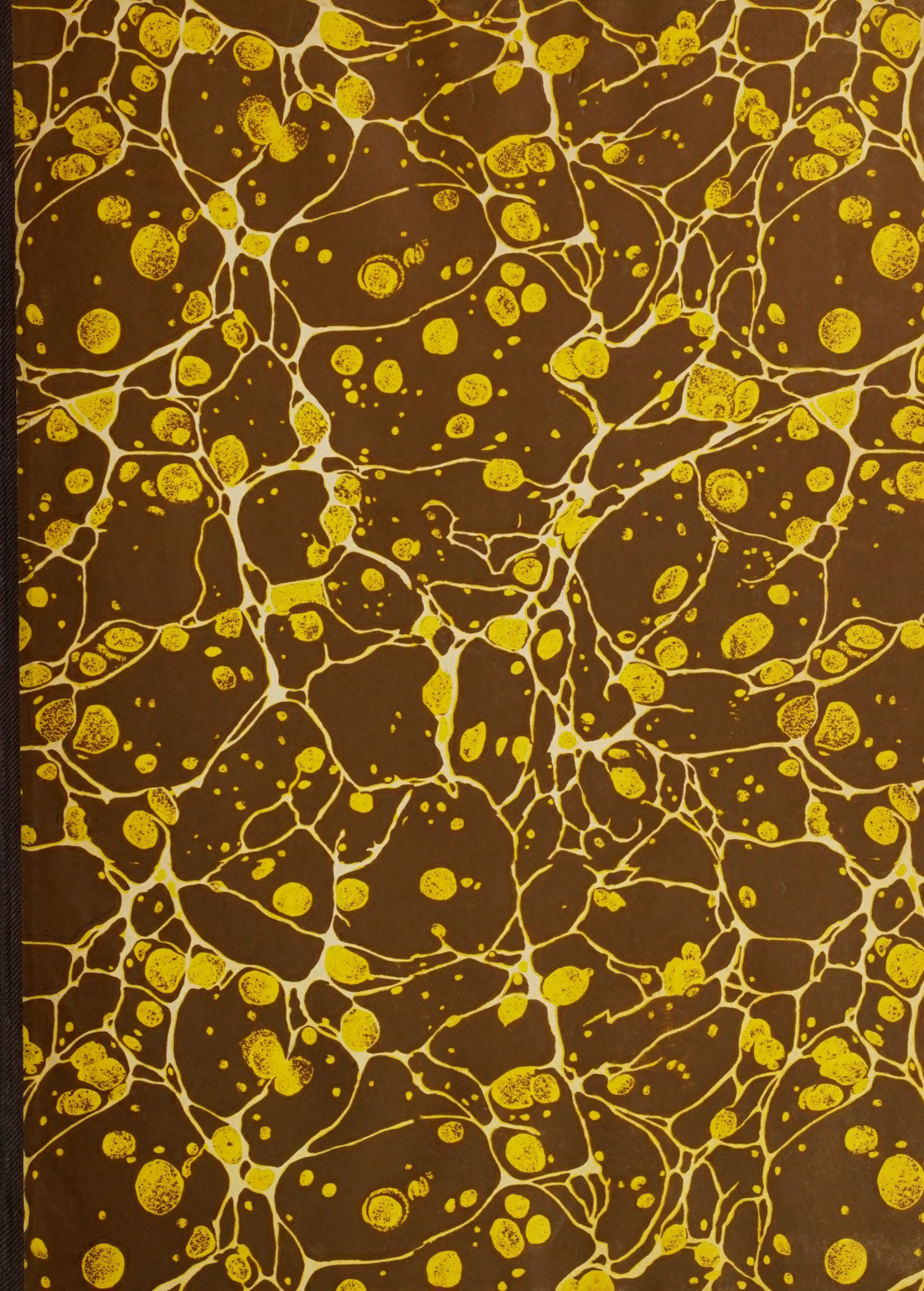
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NORTHWEST FLORA

BY

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*Published in September, 1912, file Prof. Frye (in
letter to W. A. D.)*

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YMA 2811
YMA 2812
YMA 2813

Introduction

This book was written primarily on account of the imperative need for it in our own classes at the University of Washington. Geographically it covers Oregon, Idaho, Washington and the southwest corner of British Columbia; and it includes only the flowering plants. The aim has been a book complete for a large area, with complete keys based so far as possible upon easily determined characters, with common names, and with as much description as possible without exceeding a textbook price. In the names the attempt has been to vary as little as possible from other northwestern books, believing that uniformity is far more important than rules of precedence in names. Wherever we have had to choose we have leaned toward the classification in Engler and Prantl, and toward the Vienna code.

This book is not a research work, but an attempt to make usable a part of what is already known. We have made use of other books, of pamphlets, and of journals, whenever we have found them useful. Among the books found most helpful we mention the following in alphabetical order: Coulter & Nelson's "New Manual of Rocky Mountain Botany," Engler & Prantl's "Die natürliche Pflanzenfamilien," Howell's "Flora of Northwest America," Piper's "Flora of the State of Washington," Robinson & Fernald's "Gray's New Manual of Botany."

Following the genus descriptions is given the origin or meaning of the generic name. In this we received assistance from Dean A. S. Haggett (Greek) and Prof. David Thomson (Latin) of the University of Washington; but for any errors in these, as in other portions of the book, we assume all responsibility. That it is free from errors is not a reasonable hope, on account of the vast multitude of minute details of fact, as well as arrangement.

To illustrate the use of the keys let us take the common large-leaved maple. Beginning on page 5 with the Key to the Families, compare A with AA; evidently this maple falls under AA. Compare the next letter (C) under AA with its double (CC); this maple goes to CC, which refers to the Key to the Dicotyledons on page 7. There compare A with AA, to find it goes to A; then the first letter (B) under A with its double (BB), tracing it to BB; likewise thru the C's and D's to the family ACERACEAE, page 249. There comparing with the family description, whose chief characteristics are in *italics*, it is found to agree. Since there is only 1 genus (ACER) in this family, it follows directly, with the common name (MAPLE) of the group to the right. Comparing the plant with the genus description, short in this case, it is found to agree. Under it compare A with AA, tracing it to A; compare then B, BB, BBB, finding it goes to BB. Then follows W. C. E., which gives its distribution (See abbreviations, p. 4); then A. macrophyllum, the scientific name. In this, A. is the abbreviation of the genus name, ACER, and macrophyllum is the species name. This is followed by "Pursh," the name of the man who named this plant. "Large-leaved Maple" follows, and is the common name of this particular maple. The scientific name is often preceded by synonyms in *italics*.

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Abbreviations

After a scientific name there is often an abbreviation of the name of the botanist who named the plants. These are used mostly in scientific references by specialists in botany, and are therefore not included in the list below.

C.=In the Cascade Mountains.

E.=East of the Cascade Mountains.

Gr. (in explanations of generic names)=Greek.

L. (in explanations of generic names)=Latin.

p.=page.

pp.=pages.

U.=Southwestern Oregon, and not otherwise west of the Cascade Mountains.

W.=West of the Cascade Mountains.

Key to the Families

- A. GYNOSPERMS (CONE-BEARERS)—Trees or shrubs, evergreen (except *Larix*), cone-bearers (except *Taxus* and *Juniperus*); leaves either needles or scales; ovules not enclosed in an ovary.
- B. Fruit a red berry; leaves complanate, scattered, needle-like, flat, sharply acute or acuminate; ovule 1; flowers dioicous, solitary, axillary. TAXACEAE (p. 25)
- BB. Fruit either a woody cone or a bluish berry; leaves not agreeing with the above in all points; ovules 2 to several on each scale; flowers mostly monoicous, mostly several grouped together forming cones; cones usually axillary. PINACEAE (p. 25)
- AA. ANGIOSPERMS (OVARY-PLANTS)—Trees or shrubs or herbs, mostly not evergreen; inflorescence rarely cone-like; leaves rarely needles or scales; ovules enclosed in an ovary.
- C. MONOCOTYLEDONS—Herbs or one a vining shrub (*Smilax*), some leafless and floating; leaves parallel-veined, or the chief veins from the base, or 1-veined, or none; flower parts in 3's, rarely in 4's, never in 5's; wood usually in bundles scattered thruout the stem; cotyledon 1.
- D. Plants free-floating; body thalloid, without a distinct stem or leaf; roots unbranched or none. LEMNACEAE (p. 89)
- DD. Plants not free-floating or if so having leaves; leaves usually present; stem present or the leaves tufted at base; roots present, usually branched.
- E. Leaves narrow, linear or grass-like. GROUP 1 (p. 5)
- EE. Leaves none, or mere scales, or at least some of them too wide to be linear. GROUP 2 (p. 7)
- CC. DICOTYLEDONS—Herbs or shrubs or trees, never leafless when floating; leaves netted-veined, or the chief veins from the base, or 1-veined, or none; flower parts rarely in 3's, mostly in 4's or 5's; wood usually in a circle or in several concentric circles about a central pith; cotyledons 2. KEY TO THE DICOTYLEDONS (p. 7)

GROUP 1—Monocotyledons with narrow leaves

- A. Plants growing in salt water near the low-tide line, submerged in the sea; leaves 3—20 dm. long, flat or folded lengthwise. NAIADACEAE (p. 31)
- AA. Plants not growing near the low-tide line of the sea altho sometimes growing along seashores; leaves often not as above.
- B. Plants submerged in fresh or saline waters; leaves opposite or whorled, not over 5 mm. wide.
- C. Leaves toothed at margin, 0.4—2 mm. wide, 8—25 mm. long. *Najas* in NAIADACEAE (p. 31)
- CC. Leaves entire.
- D. Leaves 1 mm. or less wide, 2—10 cm. long; stipules 2 cm. or less long. *Zannichellia* in NAIADACEAE (p. 31)
- DD. Leaves 2—4 mm. wide, 0.5—1 cm. long; stipules none. *Philotria* in HYDROCHARITACEAE (p. 36)
- BB. Either not water-plants, or else the leaves alternate or all basal or none or rarely a few of the upper opposite; leaves often more than 5 mm. wide.
- E. Plants submerged or partly floating but nothing other than the inflorescence rising out of the water.
- F. Plant stemless; leaves basal, terete, 1—45 mm. in diameter. *Lilaea* in NAIADACEAE (p. 31)
- FF. Plants with evident stem; leaves mostly flat, less than 1.5 mm. in diameter if terete.

- G. Leaves either with distinct dilated stipular sheath or with axillary stipules; flowers greenish, 4 to many in an umbel-like or spike-like cluster.
NAIADACEAE (p. 31)
- GG. Leaves with neither dilated sheath nor axillary stipules.
- H. Leaves equitant; flowers 10 or more in a head, monoicous, greenish or whitish.
SPARGANIACEAE (p. 30)
- HH. Leaves not equitant; flowers 1—2 in a cluster, perfect, bright-yellow.
PONTEDERIACEAE (p. 90)
- EE. Plants not submerged nor floating, at least rising out of the water if growing in it.
- I. Flowers surrounded by chaffy bracts or bristles or fine hairs, and no other perianth present, or no perianth at all.
- J. Cat-tails; perianth of many fine hairs; flowers in a cylindric spike-like cluster 10 cm. or more long and 2—2.5 cm. in diameter.
TYPHACEAE (p. 30)
- JJ. Not cat-tails; perianth none, or of chaffy bracts, or of stiff usually serrate bristles, or of fine hairs (*Eriophorum*); flowers either not in spikes or the spikes smaller.
- K. Perianth of 1—3 chaffy bracts, or of hairs or bristles, or none at all; ovary 1-celled, 1-seeded; stems hollow or not so; flowers often in spikelets.
- L. Flowers monoicous, each subtended by 3 chaffy bracts; fruits aggregated into spherical bur-like heads; growing along borders of ponds in mud or shallow water.
SPARGANIACEAE (p. 30)
- LL. Flowers mostly perfect, each subtended by 1—2 chaffy bracts; fruits rarely aggregated into spherical bur-like heads; often growing on dry land.
- M. Leaves 2-ranked; margins of leaf sheath not united; stem hollow in nearly all species; fruit a grain.
GRAMINACEAE (p. 36)
- MM. Leaves 3-ranked; margins of leaf sheath united; stem solid; fruit an akene.
CYPERACEAE (p. 74)
- KK. Perianth of 6 similar chaffy bracts; ovary either 3-celled or 1-celled with 3 parietal placentae, 3 to many seeded; stem not hollow; flowers not in spikelets.
JUNCACEAE (p. 90)
- II. Flowers with green or colored perianth which is not chaff nor hair-like nor bristle-like.
- N. Leaves without petiole, sheathing at base; sheath dilated and projecting as stipular points where it joins the blade; ovary superior; perianth small, green, not flower-like.
JUNCAGINACEAE (p. 34)
- NN. Leaves often petioled, sometimes sheathing at base but in such case the sheath not projecting as stipular points where it joins the blade; ovary superior or inferior; perianth often conspicuous and colored, flower-like even when greenish.
- O. Ovary superior; flowers regular.
See MELANTHACEAE, LILIACEAE and CONVALLARIACEAE (p. 94)
- OO. Ovary inferior; flowers regular or irregular.
- P. Leaves equitant; flowers regular; stamens and style not coherent; anthers 3.
IRIDACEAE (p. 110)
- PP. Leaves not equitant; flowers irregular; stamens and style coherent; anthers 1—2.
ORCHIDACEAE (p. 112)

GROUP 2—Monocotyledons with wide leaves

- A. Plant with a skunk-like odor; leaves 3—10 dm. long, oval; flowers forming a fleshy cone (spadix) 5—15 cm. long surrounded by a bright-yellow leaf (spathe).
ARACEAE (p. 89)
- AA. Plant without skunk-like odor; leaves either not oval or smaller; inflorescence not as above.
- B. Leaves more than 2, all basal, ovate or oval to triangular-sagittate; petioles rather long; growing in mud or water along ponds. ALISMACEAE (p. 35)
- BB. Leaves not as above in all points.
- C. Plant submerged altho sometimes with floating leaves; flowers in spikes, inconspicuous. *Potamogeton* in NAIADACEAE (p. 31)
- CC. Plant not submerged altho occasionally growing in wet places; flowers sometimes in spikes, mostly conspicuous.
- D. Perianth regular; ovary superior except in IRIDACEAE.
- E. Flowers enveloped by chaffy bracts and without other perianth; bracts of the perianth green or brown, less than 1 cm. long; plants rush-like or grass-like. JUNCACEAE (p. 90)
- EE. Flowers with white or colored corolla or perianth; perianth not chaffy, mostly more than 1 cm. long; plants mostly not rush-like but often grass-like.
- F. Ovary superior; leaves mostly not equitant; either stamens 4 or 6, or else 3 and also 3 staminodia.
- G. Herbs, without tendrils.
See MELANTHACEAE, LILIACEAE and CONVALLARIACEAE (p. 94)
- GG. Climbing shrubs, with stipular tendrils. SMILACEAE (p. 110)
- FF. Ovary inferior; leaves equitant; stamens 3; staminodia none.
IRIDACEAE (p. 110)
- DD. Perianth irregular; ovary inferior. ORCHIDACEAE (p. 112)

KEY TO THE DICOTYLEDONS

- A. Trees or shrubs (including woody vines).
- B. Leaves opposite. GROUP 3 (p. 9)
- BB. Leaves alternate.
- C. Trees. GROUP 4 (p. 10)
- CC. Shrubs.
- D. Leaves compound. GROUP 5 (p. 11)
- DD. Leaves simple.
- E. Branches with spines or prickles; leaves not evergreen. GROUP 6 (p. 11)
- EE. Branches without spines or prickles.
- F. Leaves evergreen. GROUP 7 (p. 12)
- FF. Leaves deciduous. GROUP 8 (p. 13)
- AA. Herbs.
- G. Stems 12 mm. or more thick, very fleshy; leaves represented by conspicuous spines. CACTACEAE (p. 258)
- GG. Stems either not so thick or else not fleshy; leaves not mere spines in case the stem is fleshy.
- H. Leaves opposite or whorled.
- I. Leaves compound. GROUP 9 (p. 14)
- II. Leaves simple.
- J. Plant prostrate, matted, very prickly; leaves awl-shaped, 6—10 mm. long, prickle-pointed, very dense; on sand near the seashore. ILLECEBRACEAE (p. 160)

- JJ. Not as above in all points.
- K. Plant parasitic on the branches of trees; leaves mere scales or normal, thick, mostly olive- or whitish-green. LORANTHACEAE (p. 128)
- KK. Plants not parasitic on the branches of trees; leaves various, usually normal.
- L. Plant densely hoary with stellate hairs, straight hairs also present; leaves ovate, entire, obtuse, at base cuneate or rounded, 1—5 cm. long. *Piscaria* in EUPHORBIACEAE (p. 245)
- LL. Plant not hoary with stellate pubescence; leaves mostly not fitting the above.
- M. Leaves in whorls of 3 or more, the whorls scattered along elongated stems. GROUP 10 (p. 15)
- MM. Leaves opposite or merely in a basal or a terminal whorl.
- N. Plants submerged or in water or in very wet places; leaves 2 cm. or less long, entire; submerged leaves lanceolate or narrower; floating or emerged leaves linear to obovate; plant Chickweed-like in appearance, slender, 5—45 cm. high or long; ovary 4-celled; styles 2. CALLITRICHACEAE (p. 246)
- NN. Plants not as above in all the vegetative characters.
- O. Stems prickly; flowers in heads; leaves 10—15 cm. long, lanceolate, sessile; flower-parts in 4's. DIPSACACEAE (p. 368)
- OO. Either stems not prickly or flowers not in heads.
- P. Twining vines with palmately veined and lobed leaves. *Humulus* in MORACEAE (p. 126)
- PP. Not vines, or if so leaves not as above.
- Q. Corolla none or of separate petals.
- R. Ovary and fruit superior. GROUP 11 (p. 15)
- RR. Ovary and fruit inferior. GROUP 12 (p. 17)
- QQ. Corolla of united petals.
- S. Plants with milky juice.
- T. Ovaries distinct but their styles and stigmas united, carpels later separating into 2 distinct fruits; stamens mostly monadelphous; pollen united into waxy masses. ASCLEPIADACEAE (p. 308)
- TT. Carpels quite distinct even in flowering; stamens distinct; pollen of simple grains. APOCYNACEAE (p. 308)
- SS. Plants without milky juice. GROUP 13 (p. 17)
- HH. Leaves alternate or all basal.
- U. Leaves compound. GROUP 14 (p. 18)
- UU. Leaves simple.
- V. Plants without green color; either white or yellow or red or brown. GROUP 15 (p. 19)
- VV. Plants with green color, altho also often with other colors present.
- W. Petals none, but calyx often petal-like. GROUP 16 (p. 20)
- WW. Petals present, distinct to base.
- X. Stamens many, at least more than 10 and twice as many as petals. GROUP 17 (p. 21)
- XX. Stamens 10 or fewer, or if more not exceeding twice the number of petals. GROUP 18 (p. 22)
- WWW. Petals present, more or less united. GROUP 19 (p. 23)

GROUP 3—Trees and shrubs with opposite leaves

- A. Leaves compound.
 - B. Plants vine-like, climbing by their petioles; fruit a head of akenes with plumose tails. *Clematis* in RANUNCULACEAE (p. 162)
 - BB. Plants not vine-like, not at all climbing; fruit not as above.
 - C. Leaflets entire or very nearly so; fruit 1-winged. OLEACEAE (p. 304)
 - CC. Leaflets serrate or toothed; fruit either 2-winged or a berry.
 - D. Leaflets serrate with close regular equal projections; fruit a berry, not winged. *Sambucus* in CAPRIFOLIACEAE (p. 364)
 - DD. Leaflets toothed or lobed with irregular unequal projections; fruit dry, 2-winged. ACERACEAE (p. 249)
- AA. Leaves simple.
 - E. Leaves palmately veined, or with 3 or more large veins from the base.
 - F. Vines, climbing by tendrils. VITACEAE (p. 251)
 - FF. Not vines, erect or spreading.
 - G. Leaves palmately lobed.
 - H. Fruit a red drupe, not winged; flowers in cymes; shrubs 6—30 dm. high. *Viburnum* in CAPRIFOLIACEAE (p. 364)
 - HH. Fruit dry, 2-winged; flowers in racemes or fascicles; shrubs or trees. ACERACEAE (p. 249)
 - GG. Leaves not palmately lobed altho sometimes coarsely dentate.
 - I. Leaves acute; stipules none; petals distinct to base; fruit a capsule. HYDRANGEACEAE (p. 203)
 - II. Leaves rounded at both ends; stipules present; petals united at base; fruit a drupe. *Viburnum* in CAPRIFOLIACEAE (p. 364)
 - EE. Leaves pinnately veined, with only 1 large vein from the base.
 - J. Plants parasitic on trees; leaves entire, often scale-like. LORANTHACEAE (p. 128)
 - JJ. Plants not parasitic; leaves entire or not entire, usually not scale-like.
 - K. Leaves densely scurfy at least beneath. ELEAGNACEAE (p. 259)
 - KK. Leaves not scurfy.
 - L. Plants hoary, 3—6 dm. high, erect; bark ashy-gray, shreddy; leaves 2.5 cm. or less long, entire, obtuse or retuse, spatulate to obovate. *Ramona* in MENTHACEAE (p. 331)
 - LL. Plants not hoary, often taller or vine-like; bark not as above; leaves various.
 - M. Leaves scale-like, 2—4 mm. long; plants 3 dm. or less high, erect or ascending. *Cassiope* in ERICACEAE (p. 294)
 - MM. Leaves not scale-like, mostly longer; plants various.
 - N. Small creeping vine with mint odor. *Micromeria* in MENTHACEAE (p. 331)
 - NN. Either not a vine or one without mint odor.
 - O. Vines, twining or merely creeping. CAPRIFOLIACEAE (p. 364)
 - OO. Not vines, erect or decumbent.
 - P. Petals united; leaves entire or coarsely lobed.
 - Q. Plants of peat bogs; leaf-margin revolute; ovary superior; fruit dry. *Kalmia* in ERICACEAE (p. 294)
 - QQ. Not plants of peat bogs; leaf-margin plane.
 - R. Ovary inferior; stamens all anther-bearing, as many as the corolla-lobes; either fruit berry-like or plant creeping. CAPRIFOLIACEAE (p. 364)
 - RR. Ovary superior; anther-bearing stamens 1 fewer than

- the corolla-lobes, antherless stamen 1; fruit dry; plant not creeping. SCROPHULARIACEAE (p. 341)
- PP. Petals distinct; leaves entire or serrulate or spinose-toothed.
- S. Twigs conspicuously 4-angled.
- T. Leaves entire, evergreen, obtuse or acutish.
Garrya in CORNACEAE (p. 290)
- TT. Leaves serrulate, deciduous, acuminate.
Euonymus in CELASTRACEAE (p. 248)
- SS. Twigs not 4-angled.
- U. Leaves 3 cm. or more long, entire; stipules minute.
CORNACEAE (p. 290)
- UU. Leaves 3 cm. or less long, serrulate at least above the middle or spine-toothed or rarely quite entire; stipules either none or large and warty.
- V. Leaves serrulate above the middle, without conspicuous divergent parallel veins; flower-parts in 4's; ovary 2-celled. Pachistima in CELASTRACEAE (p. 248)
- VV. Leaves either entire or spine-toothed near the apex, with numerous conspicuous straight parallel veins diverging from the mid-vein; flower parts in 5's; ovary 3-celled. Ceanothus in RHAMNACEAE (p. 250)

GROUP 4—Trees with alternate leaves

- A. Leaves compound. SORBUS in MALACEAE (p. 221)
- AA. Leaves simple.
- B. Leaves coriaceous, evergreen.
- C. Bark conspicuously reddish, peeling off in great patches; leaves oval or elliptical, 7—15 cm. long; fruit a red berry. Arbutus in ERICACEAE (p. 294)
- CC. Bark not conspicuously reddish, not conspicuously peeling off; leaves various.
- D. Leaves oblanceolate, 5—10 cm. long, 12—25 mm. wide, either entire or serrate near the tip. MYRICACEAE (p. 122)
- DD. Leaves not oblanceolate, often not as above in size or margin.
- E. Leaves either cuneate-obovate, or else lanceolate and only 1—2.5 cm. long; fruit akenes, with hairy tails 5—15 cm. long.
Cercocarpus in ROSACEAE (p. 206)
- EE. Leaves not cuneate-obovate, not lanceolate unless more than 2.5 cm. long; fruit not akenes, not tailed.
- F. Leaves lanceolate, acute, entire, glabrous on both sides, not scurfy; fruit a drupe about 2 cm. long. LAURACEAE (p. 173)
- FF. Leaves either not lanceolate or scurfy beneath if so; fruit dry, a nut (acorn) in a cup, or else several nuts in a long-prickly involucre cover. FAGACEAE (p. 124)
- BB. Leaves mostly herbaceous, deciduous.
- G. Bark plainly splitting around the trunk rather than longitudinally.
- H. Flowers in aments or cone-like clusters, sessile; fruits grouped into a dry cone-like mass; terminal winter buds none. BETULACEAE (p. 122)
- HH. Flowers in racemes or umbels, pedicelled; fruits separate, fleshy, drupes; terminal winter buds present. AMYGDALACEAE (p. 223)
- GC. Bark splitting longitudinally.
- I. Staminate flowers in aments and sometimes the pistillate flowers also.
- J. Fruit an aggregate berry, blackberry-like.
Morus in MORACEAE (p. 126)
- JJ. Fruit dry, nut-like or cone-like.

- K. Fruit a cup containing an acorn; leaves often deeply lobed or cleft; primary lateral veins extending into the teeth; winter buds with more than 2 scales; terminal winter buds present. FAGACEAE (p. 124)
- KK. Fruits in a cone-like or ament-like cluster; leaves in most species shallowly if at all lobed; bud scales 1 to many; terminal winter buds present or none.
- L. Primary lateral leaf-veins extending into the teeth or lobes; seed a winged nutlet; calyx present; bracts thick in fruit. BETULACEAE (p. 122)
- LL. Primary lateral leaf-veins arching and uniting within the margins; seed hairy; calyx none; bracts thin in fruit. SALICACEAE (p. 117)
- II. Flowers not in aments.
- M. Leaves ovate, somewhat falcate, distinctly oblique at base, coarsely serrate, 3-veined from the base. Celtis in ULMACEAE (p. 126)
- MM. Leaves not as above in all the characters mentioned.
- N. Fruit dry, wing-margined. Ulmus in ULMACEAE (p. 126)
- NN. Fruit fleshy, not even angular.
- O. Petals 6 mm. or more long; stamens many; leaves usually distinctly serrate; winter buds covered with scales. MALACEAE (p. 221)
- OO. Petals 5 mm. or less long; stamens 5; leaves entire or finely serrate; winter buds naked; taste of the bark characteristic. Rhamnus in RHAMNACEAE (p. 250)

GROUP 5—Shrubs with alternate compound leaves

- A. Leaves evergreen, coriaceous, spine-toothed at margin, bunched at the stem tips; stems not prickly. Berberis in BERBERIDACEAE (p. 172)
- AA. Leaves deciduous or evergreen; the evergreen plants with leaves scattered along prickly stems and without spine-toothed leaf margins.
- B. Twigs dark-green, sharply 4-angled, very long; leaflets 3, 2.5 cm. or less long, leaves not abundant; fruit a bean-like pod. Cytisus in LEGUMINACEAE (p. 224)
- BB. Twigs not dark-green, not angled; leaves and leaflets various; fruit not bean-like.
- C. Either vines, or else plants with prickly stems. ROSACEAE (p. 206)
- CC. Not vines; stems not prickly.
- D. Leaflets 7—31; fruit red.
- E. Leaflets 13—31, acuminate; stem simple or very little branched; inflorescence conical, hairy; fruit with red hairs. ANACARDIACEAE (p. 247)
- EE. Leaflets 7—17, acute to obtuse; stem considerably branched; inflorescence flat-topped, glabrous; fruit red, glabrous. Sorbus in MALACEAE (p. 221)
- DD. Leaflets 3—7; fruit red or some other color.
- F. Leaflets subulate to linear, sharp-pointed. POLEMONIACEAE (p. 311)
- FF. Leaflets not subulate nor sharp-pointed.
- G. Leaflets 0.4—2.5 cm. long; either the plant silky-villous or the leaflets cuneiform. ROSACEAE (p. 206)
- GG. Leaflets 2.5—7.5 cm. long; plant glabrous; leaflets not cuneiform. ANACARDIACEAE (p. 247)

GROUP 6—Shrubs with alternate simple deciduous leaves and spiny or prickly branches

- A. Leaves palmately veined.
- B. Twigs 12—25 mm. thick; leaves 15—40 cm. wide; inflorescence terminal, conical, of very many flowers. Echinopanax in ARALIACEAE (p. 270)

- BB. Twigs 6 mm. or less thick; leaves 7 cm. or less wide; inflorescence lateral and few-flowered, or flowers solitary in the leaf axils.
- C. Plant prostrate, creeping. *Rubus* in ROSACEAE (p. 206)
- CC. Plant erect or spreading. GROSSULARIACEAE (p. 204)
- AA. Leaves pinnately veined or 1-veined.
- D. Spines few, very stout, 1.5—5 cm. long; leaves serrate, ovate to obovate, 2.5—7.5 cm. long. *Crataegus* in MALACEAE (p. 221)
- DD. Spines more slender, often shorter; leaves entire, usually narrower and shorter.
- E. Leaves 8—12 mm. long; petals white. *Forsellesia* in CELASTRACEAE (p. 248)
- EE. Leaves 12—37 mm. long; petals yellow or none.
- F. Flowers in heads; at least the young parts of the plant white-woolly; petals yellow. *Tetradymia* in COMPOSITACEAE (p. 372)
- FF. Flowers not in heads; young parts of the plant often mealy or pubescent but rarely white-woolly; petals yellow or none.
- G. Petals yellow, 10—15 mm. long; leaves sometimes lanceolate, mostly acicular and about 12 mm. long. *Ulex* in LEGUMINACEAE (p. 224)
- GG. Petals none; leaves linear to obovate, 12—37 mm. long. CHENOPODIACEAE (p. 140)

GROUP 7—Shrubs with alternate simple evergreen leaves and without spines or prickles on the branches

- A. Staminate flowers in aments; fruits in an ament-like cluster, or composed of a nut (acorn) in an involucre cup, or composed of 1—3 nuts in a very spiny involucre cup covering.
- B. Leaves oblanceolate, mostly serrate near the tip, not scurfy beneath; fruits in an ament-like cluster. MYRICACEAE (p. 122)
- BB. Leaves either not oblanceolate, or else scurfy beneath and the margin entire. FAGACEAE (p. 124)
- AA. Flowers not in aments; fruit not as above.
- C. Petals none or distinct to the base.
- D. Sepals 3 or 6; petals 3 or none; leaves with only 1 chief vein from the base.
- E. Leaves not aromatic, linear-oblong, crowded, obtuse, 4—8 mm. long, revolute at margin; stamens 2—4; ovaries 2 to several; drupe 4—6 mm. long; plant 1—4.5 dm. high. EMPETRACEAE (p. 246)
- EE. Leaves very aromatic, lanceolate-oblong, acute, rounded to acute at base, 5—10 cm. long, not revolute at margin; stamens 9; ovary 1; drupe 20—25 mm. long; plant 3—21 m. high. LAURACEAE (p. 173)
- DD. Sepals 4—5; petals 4—5 or none.
- F. Petals none; stamens 15—25; fruit an akene, with a hairy tail 5—10 cm. long. *Cercocarpus* in ROSACEAE (p. 206)
- FF. Petals present; stamens 10 or fewer; fruit either fleshy or a capsule, not tailed.
- G. Leaves either densely woolly beneath, or with red hairs on the petiole and the veins beneath. *Ledum* in ERICACEAE (p. 294)
- GG. Leaves not woolly beneath, glabrous or nearly so.
- H. Shrub 7.5—30 cm. high; leaves sharply serrate; stamens 10; ovary 5-celled. *Chimaphila* in PYROLACEAE (p. 291)
- HH. Shrub taller; leaves entire or serrulate; stamens 4—5; ovary 2—4-celled. RHAMNACEAE (p. 250)
- CC. Petals and sepals both present; petals more or less united into 1 piece.
- I. Ovary inferior; leaves oval to ovate, 2.5 cm. or less long, not densely crowded. VACCINIACEAE (p. 299)

II. Ovary superior; leaves often not agreeing with the above.

J. Leaves lanceolate, 7.5—15 cm. long; corolla purple, 10—13 mm. long, tubular or funnellform. *Eriodictyon* in HYDROPHYLLACEAE (p. 316)

JJ. Leaves either not lanceolate or else smaller; corolla not as above in all points. ERICACEAE (p. 294)

GROUP 8—Shrubs with alternate simple deciduous leaves and without spines or prickles on the branches

A. Leaves pinnately or palmately 3—9-parted or -divided; leaf-segments subulate or linear, sharp-pointed, 8—20 mm. long. POLEMONIACEAE (p. 311)

AA. Leaves not as above in all points.

B. Staminate and sometimes also the pistillate flowers in aments.

C. Ovary superior; pistillate flowers also in aments; flowers monoicous or dioicous.

D. Calyx none; bracts thin in fruit; seed not winged.

E. Bracts scaly; fruit a 1-seeded nutlet, wax-coated or drupe-like; seed not hairy; winter buds with many scales. MYRICACEAE (p. 122)

EE. Bracts herbaceous; fruit a many-seeded capsule, neither wax-coated nor drupe-like; seed hairy; winter buds with only 1 scale.

SALICACEAE (p. 117)

DD. Calyx present; bracts thick in fruit; seed a winged nutlet.

BETULACEAE (p. 122)

CC. Ovary inferior; pistillate flowers few or solitary, not in aments; flowers monoicous.

F. Nut in a spineless and either foliaceous or tubular involucre; anther-cells separate; leaves velvety to the touch. *Corylus* in BETULACEAE (p. 122)

FF. Nut either in a spiny or in a cup-like involucre; anthers 2-celled; leaves not velvety to the touch. FAGACEAE (p. 124)

BB. Flowers in heads. COMPOSITACEAE (p. 372)

BBB. Flowers neither in aments nor in heads, though sometimes in dense spikes.

G. Leaves palmately veined or 3-veined from the base.

H. Leaves more or less lobed.

I. Pistils more than 1; fruit either dry or else an aggregate composed of the ripened ovaries. ROSACEAE (p. 206)

II. Pistil only 1; fruit a berry composed of the single ripened ovary.

GROSSULARIACEAE (p. 204)

HH. Leaves not at all lobed.

J. Leaves somewhat falcate, very unequal at base, sharply serrate, acute or acuminate. ULMACEAE (p. 126)

JJ. Leaves not falcate, equal at base, often with margin and apex not as above. RHAMNACEAE (p. 250)

GG. Leaves 1-veined, or pinnately veined with only 1 chief vein from the base.

K. Petals none; leaves entire.

L. Stipules present; plant not mealy; sepals petal-like or scarious or scale-like. POLYGONACEAE (p. 130)

LL. Stipules none; young parts of the plant often mealy; sepals herbaceous. CHENOPODIACEAE (p. 140)

KK. Petals present; leaves entire or not.

M. Ovary superior.

N. Petals distinct to base.

O. Stamens many, 25 or more; pistils often more than 1.

P. Fruit 1 or more dry pods or akenes. ROSACEAE (p. 206)

PP. Fruit 1—5 fleshy drupes. AMYGDALACEAE (p. 223)

OO. Stamens 4—10; pistil only 1.

Q. Flowers solitary, terminal or in the axils, red; stamens 10; leaves lanceolate, petiole and the veins beneath red-hairy.

Cladothamnus in ERICACEAE (p. 294)

QQ. Flowers in clusters, white or blue; stamens 4—5; leaves not as above.

RHAMNACEAE (p. 250)

NN. Petals more or less united into 1 piece.

R. Ovary and fruit 2-celled; corolla rotate; fruit a red or blue berry.

Solanum in SOLANACEAE (p. 339)

RR. Ovary and fruit 3—5-celled; corolla campanulate to urn-shaped, or when rotate the fruit dry.

ERICACEAE (p. 294)

MM. Ovary inferior.

S. Petals distinct; twigs not 4-angled nor conspicuously green; stamens 20.

MALACEAE (p. 221)

SS. Petals more or less united into 1 piece; twigs somewhat 4-angled and dark-green; stamens 10 or fewer.

VACCINIACEAE (p. 299)

GROUP 9—Dicotyledonous herbs with compound leaves either opposite or in whorls

A. Plants submerged or floating; leaves dissected into capillary or very narrow segments.

B. Leaves 5—12 in a whorl; leaf-segments often with some teeth and thus stag-horn-like.

CERATOPHYLLACEAE (p. 162)

BB. Leaves alternate or opposite or not over 4 in a whorl; leaf-segments without teeth, not stag-horn-like.

C. Leaf-segments all pinnately arranged on the leaf-axis; leaves without bladders.

Myriophyllum in HALORAGIDACEAE (p. 269)

CC. Leaves repeatedly dichotomous; leaf-segments not pinnately arranged on the leaf-axis; leaves often with bladders.

Utricularia in PINGUICULACEAE (p. 361)

AA. Plants either not growing in water, or else their leaves divided into wider segments or leaflets.

D. Petals distinct.

E. Pistils several, in fruit each with a plumose tail 2.5—5 cm. long; leaflets not terete; plants often somewhat vining.

Clematis in RANUNCULACEAE (p. 162)

EE. Pistils 1—2, without plumose tail even in fruit.

F. Leaves sessile, divided into terete fleshy segments from the base, thus appearing to be whorled; carpels 5, united; ovary superior, 1-celled; sepals 4—6 mm. long.

Spergula in CARYOPHYLLACEAE (p. 152)

FF. Leaves evidently not whorled; leaf-segments not terete; carpels 2, loosely connected, each 1-celled; ovary inferior; sepals less than 4 mm. long.

UMBELLACEAE (p. 271)

FF. Leaves pinnately compound, not whorled; leaf-segments not terete; carpels 5, united, each 1-celled; ovary superior; sepals 2—8 mm. long.

Erodium in GERANIACEAE (p. 242)

DD. Petals united at least at the base.

G. Ovary superior or mainly so.

H. Leaves whorled.

Pedicularis in SCROPHULARIACEAE (p. 341)

HH. Leaves opposite.

I. Style 1, 3-lobed at apex; capsule 3-valved, 3-celled; placentae usually axial.

POLEMONIACEAE (p. 311)

II. Styles 2, often more or less united at base, sometimes united nearly to apex; capsule 2-valved, 1-celled; placentae 2, parietal.

Nemophila in HYDROPHYLLACEAE (p. 316)

GG. Ovary inferior or mainly so.

J. Flowers in terminal cymes; stamens 3; leaves 3—5-foliolate.

Valeriana in VALERIANACEAE (p. 367)

JJ. Flowers in heads; stamens 4—5; leaves various.

COMPOSITACEAE (p. 372)

GROUP 10—Dicotyledonous herbs with simple leaves in whorls of 3 or more scattered along the stem

A. Stem square; leaves 4—8 in a whorl; fruit very deeply 2-lobed or separating into 2 distinct carpels. *Galium* in RUBIACEAE (p. 363)

AA. Either the stem terete or else the leaves in whorls of 2—3; fruit not deeply lobed, not separating into distinct carpels.

B. Plants growing in water; stem simple; stamen 1.

Hippuris in HALORAGIDACEAE (p. 269)

BB. Plants of ordinary dry soil; stem normally not simple; stamens 2—10 or in *Euphorbia* only 1).

C. Leaves terete, 8—16 in a whorl; styles 5.

Spergula in CARYOPHYLLACEAE (p. 152)

CC. Leaves flat, 2—6 in a whorl; styles 1 or 3.

D. Leaves 4—6 in a whorl, 2.5 cm. or less long, spatulate or oblanceolate; stems prostrate; styles 3. AIZOACEAE (p. 147)

DD. Leaves 2—4 in a whorl, often longer, blade often widest below its middle; stems not prostrate (except sometimes in *Euphorbia*).

E. Sepals 2—3, distinct; petals 4 or 6, distinct.

Platystigma in PAPAVERACEAE (p. 173)

EE. Sepals either none or 4—8 and all somewhat united into 1 piece; petals none or united into 1 piece.

F. Corolla present; stamens 4—8.

G. Leaves in several whorls along an elongated stem.

SCROPHULARIACEAE (p. 341)

GG. Leaves either not in whorls or the whorls merely basal or terminal. PRIMULACEAE (p. 300)

FF. Corolla none; stamens 1 or 2 or 3 or 9.

H. Calyx present; stamens more than 1; fruit an akene, 3-angled.

POLYGONACEAE (p. 130)

HH. Calyx none; stamen 1; fruit a capsule, 3-celled, terete or nearly so. *Euphorbia* in EUPHORBIACEAE (p. 245)

GROUP 11—Apetalous or polypetalous dicotyledonous herbs with opposite simple leaves and superior ovary

A. Petals none.

B. Leaves 2—3-pinnatifid; leaf segments linear to lanceolate; pistils more than 1; fruit akenes with plumose tails 2.5—3.7 cm. long.

Clematis in RANUNCULACEAE (p. 162)

BB. Leaves not dissected; pistil 1; fruit without plumose tail.

C. Plants with milky juice. *Euphorbia* in EUPHORBIACEAE (p. 245)

CC. Plants without milky juice.

D. Plants with stinging hairs; stems mostly simple, erect, 4-angled, 6—21 dm. high. *Urtica* in URTICACEAE (p. 127)

DD. Plants without stinging hairs; stems not as above in all points.

E. Seeds several to many.

- F. Sepals 5; leaves entire or nearly so, ovate or narrower; styles or sessile stigmas 2—5. CARYOPHYLLACEAE (p. 152)
- FF. Sepals 4; leaves crenate to pinnatifid, often reniform to orbicular; styles and stigmas 1—2.
- G. Stamens 2 or 4; style 1; leaves not wedge-shaped at base. *Synthyris* in SCROPHULARIACEAE (p. 341)
- GG. Stamens 8; styles 2; leaves wedge-shaped at base. *Chrysosplenium* in SAXIFRAGACEAE (p. 195)
- EE. Seed 1.
- H. Lower leaves 2-lobed, the upper entire; stem weak and slender; styles and stigmas 3. *Pterostegia* in POLYGONACEAE (p. 130)
- HH. None of the leaves 2-lobed; stem stiff or fleshy; styles or stigmas 2. CHENOPODIACEAE (p. 140)
- AA. Petals present.
- I. Sepals 2; plants without milk juice. PORTULACACEAE (p. 148)
- II. Sepals or calyx segments more than 2, or else plant with milky juice.
- J. Leaves very fleshy, thick.
- K. Stipules none; leaves terete or flattish; carpels distinct at least above thus making the ovary 3—5-lobed. CRASSULACEAE (p. 193)
- KK. Stipules scarious; leaves terete; carpels united to the tip and thus the ovary not lobed. *Tissa* in CARYOPHYLLACEAE (p. 152)
- JJ. Leaves not fleshy, thin or coriaceous.
- L. Leaves entire.
- M. Leaves obovate, scattered along an elongated prostrate or floating stem; sepals and stamens 2—4. *Elatine* in ELATINACEAE (p. 254)
- MM. Leaves not obovate; stems often not as above; sepals and stamens usually more numerous.
- N. Leaves all basal; ovary 1-celled; placentae 3—4, parietal; sepals and petals and stamens 5 each. *Parnassia* in SAXIFRAGACEAE (p. 195)
- NN. Leaves not all basal; ovary 1—18-celled; placentae axial or parietal; sepals and petals and stamens not always 5 each.
- O. Sepals 2—3; ovary 3—18-celled; placentae parietal. PAPAVERACEAE (p. 173)
- OO. Sepals 4—6; ovary 1—10-celled; placentae axial.
- P. Leaves punctate with immersed pellucid resinous glands, often with small black spots; petals yellow, often black-spotted; stamens in 3 sets in all but 1 species. HYPERICACEAE (p. 254)
- PP. Leaves not punctate, not black-spotted; petals not yellow (except in 1 species of *Linum*), not black-spotted; stamens not in sets.
- Q. Stem 4-angled. LYTHRACEAE (p. 259)
- QQ. Stem terete.
- R. Leaves all opposite; ovary and capsule 1-celled; seed not oily. CARYOPHYLLACEAE (p. 152)
- RR. Some of the leaves alternate; ovary and capsule 2—10-celled; seed oily. LINACEAE (p. 244)
- LL. Leaves not entire.
- S. Leaves evergreen, coriaceous, ovate to orbicular; flower 1, on a scape at the summit of the simple stem. *Moneses* in PYROLACEAE (p. 291)
- SS. Leaves deciduous, herbaceous, narrowed; flowers mostly more than 1; stem usually branched.
- T. Stipules present; plant glandular-pubescent; leaves oblanceolate. *Bergia* in ELATINACEAE (p. 254)

TT. Stipules none; plant not glandular; leaves lanceolate to spatulate.

LINACEAE (p. 244)

GROUP 12—Apetalous or polypetalous dicotyledonous herbs with opposite simple leaves and inferior ovary

A. Flowers in heads; heads subtended by a white involucre; involucre bracts 4—6, 6—17 mm. long; fruit a red berry. *Cornus* in CORNACEAE (p. 290)

AA. Either flowers not in heads or else involucre not white when present; fruit not a berry, not red.

B. Flowers in umbels or heads. UMBELLACEAE (p. 271)

BB. Flowers neither in umbels nor heads.

C. Flowers in terminal or axillary involucre clusters.

CC. Flowers either not in clusters or the clusters without involucre. NYCTAGINACEAE (p. 146)

D. Leaves entire.

E. Leaves ovate to reniform, all basal, with 3—7 large veins from the base; marsh plants. *Parnassia* in SAXIFRAGACEAE (p. 195)

EE. Leaves narrower, not all basal, with only 1 large vein from the base; habitat various.

F. Stem 4—5-angled; leaves linear to linear-oblong; calyx tube less than 1 cm. long. LYTHRACEAE (p. 259)

FF. Stem terete; either the leaves wider than in F or the calyx tube more than 1 cm. long. ONAGRACEAE (p. 260)

DD. Leaves not entire.

G. Leaves roundish, abruptly cuneate at base, crenate above; petals none; stems repeatedly forked; flowers mostly solitary in the upper forks of the stem. *Chrysosplenium* in SAXIFRAGACEAE (p. 195)

GG. Leaves not fitting the above; petals 2—4; stem simple or pinnately branched; flowers in panicles or racemes. ONAGRACEAE (p. 260)

GROUP 13—Dicotyledonous herbs with opposite simple leaves and sympetalous corolla

A. Ovary superior or mainly so.

B. Corolla regular or nearly so.

C. Leaves markedly thick and fleshy; stamens more numerous than the lobes of the corolla; pistils several, simple. CRASSULACEAE (p. 193)

CC. Leaves not markedly thick and fleshy; stamens as many as the lobes of the corolla or fewer; pistil 1 and compound (except possibly in BORAGINACEAE).

D. Ovary deeply 4-lobed, forming 4 separate or separable nutlets.

BORAGINACEAE (p. 321)

DD. Ovary deeply 2-lobed, separating or separable into 2 fleshy or dry fruits.

RUBIACEAE (p. 363)

DDD. Ovary not deeply lobed, neither separating nor separable into nutlets.

E. Leaves evergreen, coriaceous; flowers terminal, solitary or in a raceme or cyme or umbel; ovary and capsule 4—5-celled. PYROLACEAE (p. 291)

EE. Leaves mostly not evergreen, not coriaceous; flowers not terminal when the leaves are evergreen.

F. Style 1; stigmas 3; capsule 3-celled. POLEMONIACEAE (p. 311)

FF. Styles 1—2; stigmas as many as the styles; capsule 1—2-celled.

G. Leaves entire.

H. Stamens often fewer than the corolla-lobes; ovary either 2-celled or else 1-celled with parietal placentae.

SCROPHULARIACEAE (p. 341)

- HH. Stamens as many as the corolla-lobes; ovary 1-celled; placenta central.
 - I. Stamens alternate with the corolla-lobes; plant without potato-like base. GENTIANACEAE (p. 305)
 - II. Stamens opposite the corolla-lobes; plant from small potato-like base. *Trientalis* in PRIMULACEAE (p. 300)
- GG. Leaves not entire.
 - J. Ovary and capsule 1-celled; stamens 5; leaves deeply pinnate-segmented. *Nemophila* in HYDROPHYLLACEAE (p. 316)
 - JJ. Ovary and capsule 2-celled; stamens 2—5; leaves various. SCROPHULARIACEAE (p. 341)
- BB. Corolla irregular.
 - K. Leaves all in a basal whorl. PINGUICULACEAE (p. 361)
 - KK. Leaves not all in a basal whorl.
 - L. Ovary 2-celled, many-seeded. SCROPHULARIACEAE (p. 341)
 - LL. Ovary 4-celled, 4-seeded.
 - M. Ovary deeply 4-lobed or -parted; flowers 1—many in the leaf axils, or in terminal heads or spike or racemes or panicles. MENTHACEAE (p. 331)
 - MM. Ovary 4-celled, terete or nearly so; flowers in terminal solitary or clustered spikes. VERBENACEAE (p. 331)
- AA. Ovary inferior or mainly so.
 - N. Vine-like, prostrate, evergreen; peduncles 2-flowered. *Linnaea* in CAPRIFOLIACEAE (p. 364)
 - NN. Not vine-like, not prostrate, mostly not evergreen; peduncles not 2-flowered.
 - O. Stamens 3, distinct; flowers in most species not in heads; calyx 4-toothed or -lobed, not a pappus. VALERIANACEAE (p. 367)
 - OO. Stamens 4—5, their anthers united; flowers in heads; calyx in most species a pappus. COMPOSITACEAE (p. 372)

GROUP 14—Dicotyledonous herbs with alternate compound leaves

- A. Plants submerged or floating; leaves dissected into narrowly linear or filiform segments or leaflets.
 - B. Leaves often with air bladders; corolla 2-lipped; pistil 1. *Utricularia* in PINGUICULACEAE (p. 361)
 - BB. Leaves without bladders; corolla of 5 similar separate petals; pistils several. RANUNCULACEAE (p. 162)
- AA. Plants mostly of drier habitat; leaves with wider segments or leaflets.
 - C. Petals none or distinct to base.
 - D. Stamens numerous, at least more than 10, and more than double the number of petals.
 - E. Pistils more than 1, distinct. ROSACEAE (p. 206)
 - EE. Pistil only 1.
 - F. Plant glandular-pubescent; leaves 3-foliolate; sepals 4, distinct; flowers less than 15 mm. wide. *Jacksonia* in CAPPARIDACEAE (p. 192)
 - FF. Plant glabrous; leaves finely dissected, segments or leaflets many; sepals 2, united; flowers over 25 mm. wide. *Eschscholtzia* in PAPAVERACEAE (p. 173)
 - DD. Stamens 10 or fewer, or if more not exceeding twice the number of petals or of sepals if there are no petals.
 - G. Ovary superior or mainly so.
 - H. Flowers regular or nearly so.
 - I. Pistils more than 1, distinct; stamens on the calyx. ROSACEAE (p. 206)

- II. Pistil only 1; stamens not on the calyx (except in SAXIFRAGACEAE).
 - J. Sepals and petals 4.
 - K. Leaves pinnate; plant with mustard or turnip taste, without bad odor. CRUCIFERACEAE (p. 176)
 - KK. Leaves ternate or palmate; plant without mustard or turnip taste, with bad odor. *Cleome* in CAPPARIDACEAE (p. 192)
 - JJ. Sepals and petals 3 or 5.
 - L. Leaves pinnately compound; plants glabrous or floccose-woolly; flowers solitary on terminal or axillary peduncles. LIMNANTHACEAE (p. 246)
 - LL. Leaves palmately compound; plants hairy but not woolly; flowers in panicles or racemes or heads. SAXIFRAGACEAE (p. 195)
 - HH. Flowers irregular. LEGUMINACEAE (p. 224)
 - GG. Ovary inferior.
 - M. Flowers in compound umbels; ovary 2-celled or the 2 carpels almost separate; fruit dry. UMBELLACEAE (p. 271)
 - MM. Flowers in umbels; umbels in simple or compound panicles; ovary 2—5-celled; fruit fleshy. *Aralia* in ARALIACEAE (p. 270)
 - CC. Petals more or less united, but sometimes only at their very base.
 - N. Corolla irregular.
 - O. Sepals 4—5, more or less united; petals 5; stamens 5 or 9 or 10; pistil simple; stipules present. LEGUMINACEAE (p. 224)
 - OO. Sepals 2, separate; petals 4; stamens 6; pistil compound; stipules none. FUMARIACEAE (p. 175)
 - NN. Corolla regular or very nearly so or none at all.
 - P. Ovary superior or mainly so.
 - Q. Leaflets 3, not spine-like, not spine-tipped; styles or stigmas 1 or 5.
 - R. Leaflets very unequal, the lateral two very much smaller than the terminal one. *Solanum* in SOLANACEAE (p. 339)
 - RR. Leaflets all three about the same size.
 - S. Marsh plants; leaflets oblong to obovate, obtuse; stems 1—2 cm. thick. *Menyanthes* in MENYANTHACEAE (p. 307)
 - SS. Not marsh plants; leaflets obovate; stems less than 5 mm. thick. OXALIDACEAE (p. 243)
 - QQ. Leaflets more than 3 or spine-like or spine-tipped; styles or stigmas 1—3.
 - T. Stigmas 3; capsule 3-celled. POLEMONIACEAE (p. 311)
 - TT. Stigmas 1—2; capsule 1—2-celled. HYDROPHYLLACEAE (p. 316)
 - PP. Ovary inferior or mainly so; flowers in heads. COMPOSITACEAE (p. 372)

GROUP 15—Dicotyledonous herbs without green color, and with alternate simple leaves or scales

- A. Vines, twining, white or yellow; ovary 2-celled, 1—4-seeded; leaves mere minute scales or almost none. CONVULVULACEAE (p. 309)
- AA. Not vines, variously colored; ovary not 2-celled, many-seeded; leaves not minute, larger.
 - B. Leaves spatulate, covered with long glandular hairs, all basal; plants of peat bogs. DROSERACEAE (p. 192)
 - BB. Leaves not spatulate, not covered with long glandular hairs, not all basal; plants not of peat bogs.

- C. Flowers irregular; stamens didynamous, inserted in the tube of the corolla; cells of the ovary 1. OROBANCHACEAE (p. 360)
- CC. Flowers regular or nearly so; stamens not didynamous, inserted on the receptacle; cells of the ovary 1 or 4 or 5.
- D. Plants reddish, glabrous, 25 mm. or less high; stem not densely covered with scales; scales entire; pollen grains in 4's. *Pyrola* in PYROLACEAE (p. 291)
- DD. Not as above in all points; pollen grains simple. MONOTROPACEAE (p. 292)

GROUP 16—Dicotyledonous herbs with alternate simple leaves and apetalous flowers

- A. Ovary and fruit superior.
- B. Pistils more than 1, distinct.
- CC. Flowers regular or nearly so; stamens not didynamous, inserted on the receptacle, 2—3 dm. long. PHYTOLACCACEAE (p. 147)
- C. Plant 1—3.5 m. high; leaves ovate-lanceolate, pinnately veined, petioled, end.
- D. Stamens on the calyx; stem 2—20 cm. long; leaves rounded, cuneate at base, 4—13 mm. long, deeply 3-lobed, lobes 2—4-cleft; stipules large, 2—5-cleft. *Alchemilla* in ROSACEAE (p. 206)
- DD. Stamens on the receptacle; stems often longer; leaves not as above in all characters; stipules none, but the base of the petiole often dilated. RANUNCULACEAE (p. 162)
- BB. Pistil only 1.
- E. Leaves lobed, palmately veined.
- F. Plant 2—20 cm. high, annual; leaves cuneate at base, 4—13 mm. long, deeply 3-lobed, lobes 2—4-cleft; stipules 2—5-cleft. *Alchemilla* in ROSACEAE (p. 206)
- FF. Plant often taller, perennial; leaves mostly cordate at base, 13 mm. or more long, shallowly lobed, lobes often not entire although not again cleft; stipules entire. *Heuchera* in SAXIFRAGACEAE (p. 195)
- EE. Leaves either not lobed or else pinnately veined.
- G. Plant stout, erect, 1—3.5 m. high; leaves entire, acute or acuminate at both ends, 2—3 dm. long; ovary 10-celled; fruit a purple berry. PHYTOLACCACEAE (p. 147)
- GG. Plant mostly not fitting the above; leaves not as above in all points; ovary 1—5-celled; fruit not a berry, dry.
- H. Plant with a mustard or radish taste. CRUCIFERACEAE (p. 176)
- HH. Plant without a mustard or radish taste.
- I. Seeds 2 or more in each pistil.
- J. Plant with milky juice; ovary and capsule 3-celled; capsule 3-seeded. *Euphorbia* in EUPHORBIACEAE (p. 245)
- JJ. Plant without milky juice; ovary and capsule 2-celled; capsule many-seeded.
- K. Plant glabrous; leaves linear to lanceolate; flowers solitary in leaf axils. *Lythrum* in LYTHRACEAE (p. 259)
- KK. Plant white-woolly; leaves lanceolate to ovate; flowers in a dense terminal cylindrical spike. *Synthyris* in SCROPHULARIACEAE (p. 341)
- II. Seed 1 in each pistil.
- L. Plant densely hoary with stellate hairs, simple ones also present; in dry regions east of the Cascades. *Piscaria* in EUPHORBIACEAE (p. 245)

- LL. Plant without stellate hairs, often with simple ones; in either dry or moist regions.
- M. Leaves with sheathing stipules. POLYGONACEAE (p. 130)
- MM. Leaves without stipules.
- N. Either the akene 3-angled in cross section, or else the calyx of 6 segments. POLYGONACEAE (p. 130)
- NN. Akene or utricle not 3-angled in cross section; calyx never of more than 5 segments.
- O. Leaves entire, 3-veined from the base, lanceolate or ovate; stamens 4; style 1 or none.
Parietaria in URTICACEAE (p. 127)
- OO. Leaves with not all 3 of the above characters; stamens sometimes 4; style sometimes 1.
- P. Leaves entire; flowers bracted; bracts and sepals scarious. AMARANTHACEAE (p. 145)
- PP. Leaves entire or not; either the flowers bractless or the bracts not scarious; sepals green or greenish.
CHENOPODIACEAE (p. 140)
- AA. Ovary and fruit inferior.
- Q. Leaves pinnately veined or only 1-veined, entire or very nearly so.
- R. Leaves linear-setaceous. *Howellia* in LOBELIACEAE (p. 370)
- RR. Leaves wider.
- S. Stem terete; flowers in cymes; fruit fleshy, drupaceous.
SANTALACEAE (p. 128)
- SS. Stem 5-angled; flowers solitary in the leaf axils; fruit dry, a capsule.
Lythrum in LYTHRACEAE (p. 259)
- QQ. Leaves palmately veined, entire or not.
- T. Leaves 4—13 mm. long, cuneate at base, deeply 3-lobed, the lobes 2—4-cleft; stipules large, 2—5-cleft; stem 2—20 cm. long.
Alchemilla in ROSACEAE (p. 206)
- TT. Leaves longer, either not cuneate at base or not deeply lobed; stipules entire or none; stem often longer.
- U. Leaves mostly in a basal tuft; stipules present; flowers in spikes or panicles; calyx-lobes less than 1 cm. long; stamens 5; ovary 1—2-celled; stem without ginger taste. *Heuchera* in SAXIFRAGACEAE (p. 195)
- UU. Leaves from an elongated creeping stem; stipules none; flowers solitary in the leaf axils; calyx-lobes 2—6 cm. long; stamens 12; ovary 5-celled; stem with ginger taste. ARISTOLOCHIACEAE (p. 130)

GROUP 17—Dicotyledonous herbs with alternate simple leaves and polypetalous flowers with numerous stamens

- A. Leaves tubular or pitcher-shaped, 2—6 dm. long. SARRACENIACEAE (p. 192)
- AA. Leaves not tubular nor pitcher-shaped, mostly less than 2 dm. long.
- B. Leaves either peltate or else rounded or ovate, 10 cm. or more wide, entire, mostly floating. NYMPHAEACEAE (p. 161)
- BB. Leaves not peltate, often not rounded or ovate, never so wide and also entire, mostly not floating.
- C. Leaves entire.
- D. Pistils more than 1.
- E. Flowers solitary or scattered; petals with a pit on the inside; calyx of 5—6 distinct sepals; stamens on the receptacle. RANUNCULACEAE (p. 162)

- EE. Flowers in spikes or panicles; petals without pit; calyx 5-cleft; stamens on the calyx tube. *Petrophytum* in ROSACEAE (p. 206)
- DD. Pistil only 1.
 - F. Annual; leaves 2—6 mm. long, linear; petals 6; plants 2—5 cm. high. *Canbya* in PAPAVERACEAE (p. 173)
 - FF. Annual or perennial; leaves longer, sometimes linear; petals rarely 6; plants mostly taller. PORTULACACEAE (p. 148)
- CC. Leaves not entire.
 - G. Pistils more than 1.
 - H. Stamens on the receptacle; sepals distinct; stipules none. RANUNCULACEAE (p. 162)
 - HH. Stamens on the calyx tube; sepals united at base; stipules present. ROSACEAE (p. 206)
- GG. Pistil only 1.
 - I. Leaves palmately veined; sepals distinct. MALVACEAE (p. 251)
 - II. Leaves pinnately veined; sepals united at base.
 - J. Stipules adnate to the petiole; stamens 5—10; stigma 1. *Horckelia* in ROSACEAE (p. 206)
 - Jl. Stipules none; stamens numerous; stigmas 3. LOASACEAE (p. 257)

GROUP 18—Dicotyledonous herbs with alternate simple leaves and polypetalous flowers with few stamens

- A. Peat bog plants; leaves all in a basal rosette, oblanceolate or spatulate, very conspicuously glandular-hairy, red or reddish-green; leaf blades not over 2 cm. long. DROSERACEAE (p. 192)
- AA. Not peat bog plants; leaves not as above in all characters.
 - B. Two or more separate pistils to each flower.
 - C. Leaves fleshy, pinnately veined or 1-veined; pistils the same in number as the sepals or the petals. CRASSULACEAE (p. 193)
 - CC. Leaves not fleshy, or if so palmately veined; pistils only rarely the same in number as the petals or the sepals.
 - D. Leaves either coriaceous and evergreen or else peltate; stamens 5—10, inserted on the calyx tube. SAXIFRAGACEAE (p. 195)
 - DD. Leaves not coriaceous and evergreen, not peltate; stamens rarely 5 or 10, inserted on the receptacle. RANUNCULACEAE (p. 162)
 - BB. Only 1 pistil to each flower.
 - E. Leaves palmately veined.
 - F. Plants with mustard or turnip taste; capsule linear; sepals 4; petals 4; stamens 6. CRUCIFERACEAE (p. 176)
 - FF. Plants without mustard or turnip taste; pod not linear; sepals none or 5; petals 5; stamens 5 or 10.
 - G. Flowers irregular; 1 petal spurred. VIOLACEAE (p. 255)
 - GG. Flowers regular or nearly so; petals not spurred.
 - H. Petals on the receptacle; ovary superior, 5-celled; flowers not in umbels. *Geranium* in GERANIACEAE (p. 242)
 - HH. Petals on the calyx; ovary superior or half inferior, 1—2-celled; flowers not in umbels. SAXIFRAGACEAE (p. 195)
 - HHH. Petals on the ovary; ovary inferior, 2-celled; flowers in umbels. UMBELLACEAE (p. 271)
 - EE. Leaves pinnately veined.
 - I. Ovary superior.

- J. Plants with mustard or turnip taste; sepals 4; petals 4; stamens 6.
 CRUCIFERACEAE (p. 176)
- JJ. Plants without mustard or turnip taste; sepals and petals rarely 4; stamens rarely 6.
- K. Flowers regular or very nearly so, not spurred.
- L. Leaves basal, linear, 2.5—7.5 cm. long, somewhat thick or fleshy; flowers in a dense head, reddish; near the seashore.
 PLUMBAGINACEAE (p. 304)
- LL. Leaves not as above in all characters; flowers not in a dense head.
- M. Sepals 2.
 PORTULACACEAE (p. 148)
- MM. Sepals 3—8.
- N. Leaves coriaceous, evergreen, glabrous.
- O. Carpels 2—4; styles or sessile stigmas 2—4.
 Saxifraga in SAXIFRAGACEAE (p. 195)
- OO. Carpels 5; style 1; stigmas 1 or 5.
 PYROLACEAE (p. 291)
- NN. Leaves not coriaceous nor evergreen, often not glabrous.
- P. Leaves very fleshy.
- Q. Petals 5, yellow; sepals 5. CRASSULACEAE (p. 193)
- QQ. Petals usually not 5, white; sepals usually not 5.
 PORTULACACEAE (p. 148)
- PP. Leaves not fleshy.
- R. Flowers axillary; stem 5-angled.
 Lythrum in LYTHRACEAE (p. 259)
- RR. Flowers in clusters; stem terete.
- S. Stamens 5, on the receptacle; ovules 2 in each cell.
 LINACEAE (p. 244)
- SS. Stamens 10, on the calyx; ovules numerous.
 Saxifraga in SAXIFRAGACEAE (p. 195)
- KK. Flowers irregular.
- T. Flowers spurred at base.
 VIOLACEAE (p. 255)
- TT. Flowers not spurred at base.
- U. Leaves entire; petals 3; stamens 6—8; stigmas 1—2; style 1; carpels 2.
 POLYGALACEAE (p. 244)
- UU. Leaves serrate; petals 2 or 4; stamens 5; stigmas 5, sessile; carpels 5.
 BALSAMINACEAE (p. 249)
- II. Ovary inferior.
- V. Flowers in umbels or heads.
 UMBELLACEAE (p. 271)
- VV. Flowers neither in umbels nor in heads.
- W. Stem 5-angled; sepals and petals usually 6; flowers axillary.
 Lythrum in LYTHRACEAE (p. 259)
- WW. Stem terete; sepals and petals fewer; flowers usually clustered.
- X. Sepals 4; petals 4; stamens 2 or 4 or 8; style 1; stigmas 1 or 4.
 ONAGRACEAE (p. 260)
- XX. Sepals 5; petals 5; stamens 10; styles or sessile stigmas 2—4.
 Saxifraga in SAXIFRAGACEAE (p. 195)
- GROUP 19—Dicotyledonous herbs with alternate simple leaves and sympetalous flowers**
- A. Ovary superior or mainly so.
- B. Corolla irregular.
- C. Leaves with stipules; corolla not 2-lipped; stamens 10.
 LEGUMINACEAE (p. 224)
- CC. Leaves without stipules; stamens 5 or fewer.

- D. Leaves all basal, on upper side greasy to touch; corolla spurred at base, 2-lipped; stamens 2. *Pinguicula* in PINGUICULACEAE (p. 361)
- DD. Leaves all basal, not greasy to the touch; corolla not spurred; stamens 2 or 4 or 5.
 - E. Corolla 2-lipped; ovary 1—2-celled. SCROPHULARIACEAE (p. 341)
 - EE. Corolla not 2-lipped; ovary 5-celled. BALSAMINACEAE (p. 249)
- BB. Corolla regular or very nearly so.
 - F. Plants twining; leaves none or scattered. CONVULVULACEAE (p. 309)
 - FF. Plants not twining; leaves reniform, palmately veined, crenate, all basal. *Nephrophyllidium* in MENYANTHACEAE (p. 307)
 - FFF. Plants not twining; leaves not reniform, not palmately veined, rarely crenate or all basal.
 - G. Leaves fleshy-linear, 2.5—7.5 cm. long, all basal; flowers in dense heads; plants not far from the seashore. PLUMBAGINACEAE (p. 304)
 - GG. Either leaves not as above in all characters, or else flowers not in heads.
 - H. Leaves very fleshy; flowers in cymes, usually yellow. CRASSULACEAE (p. 193)
 - HH. Leaves either not fleshy or else the flowers in long narrow spikes.
 - I. Leaves all basal; flowers in spikes; corolla scarious, veinless. PLANTAGINACEAE (p. 362)
 - II. Either leaves not all basal or else the flowers not in spikes; corolla not scarious, veined.
 - J. Ovary deeply 2- or 4-lobed, maturing into 2 or 4 separate or separable nutlets. BORAGINACEAE (p. 321)
 - JJ. Ovary not deeply lobed, not maturing into separate nor separable nutlets.
 - K. Style 3-cleft at apex; capsule 3-celled. POLEMONIACEAE (p. 311)
 - KK. Styles or stigmas 1—2; capsule 1—2-celled.
 - L. Stamens opposite the corolla lobes; ovary 1-celled; placenta central; style 1; stigma capitate. PRIMULACEAE (p. 300)
 - LL. Stamens alternate with the corolla lobes; often differing from the above in some of the other characters.
 - M. Corolla 20 mm. or more long. SOLANACEAE (p. 339)
 - MM. Corolla 16 mm. or less long.
 - N. Fruit a berry; inflorescence not scorpid; style 1. SOLANACEAE (p. 339)
 - NN. Fruit a capsule; inflorescence somewhat scorpid; styles often 2. HYDROPHYLLACEAE (p. 316)
 - AA. Ovary inferior or mainly so.
 - O. Vine with tendrils. CUCURBITACEAE (p. 369)
 - OO. Not a vine; tendrils none.
 - P. Flowers not in heads.
 - Q. Corolla regular; stamens distinct. CAMPANULACEAE (p. 369)
 - QQ. Corolla irregular by not being equally split between the lobes; stamens united by their anthers. LOBELIACEAE (p. 370)
 - PP. Flowers in heads. COMPOSITACEAE (p. 372)

Gymnosperms (Cone Bearers)

TAXACEAE

Yew Family

Shrubs and trees, resin-bearing (except *Taxus*), evergreen (ours) or deciduous. Leaves linear, alternate. Pollen-sacs borne separately, in clusters or solitary. Ovule 1. Fruit a fleshy ring almost covering the one hard bony seed, green or purple or red (ours). Cotyledons 2.

TAXUS

YEW

Shrubs or trees. Leaves short-petioled, flat, blue-green, rather sharply pointed. Cones or flower-bunches sessile or subsessile, very small. Staminate cones of a few scaly bracts bearing 4—8 stamens of 4—6 pollen-sacs from 1 common filament. Fruit a red berry. (Gk. *toxon*=bow; referring to use of wood.) W. C.

T. brevifolia Nutt. (Western Yew)

PINACEAE

Pine Family

Shrubs or trees, resinous, mostly evergreen. Leaves either needles or scales (ours) or flat and wide. Wood with tracheids mostly marked by large disks. Ovules and pollen-sacs in separate cones or aments. Staminate cones consisting of numerous 2—6-celled anthers. Pollen-grains often with 2 inflated sacs. Pistillate cones consisting either of scales only, or of scales and bracts, usually dry and woody, sometimes berry-like, usually more than 1-seeded when berry-like. Scales bearing 1—several ovules (usually 2) on the inner surface, few to many, woody or papery or fleshy. Seeds with or without wings. Cotyledons 2—several.

A. Leaves opposite or in whorls of 3, not sheathed when in 3's, scale-like (except sometimes in *Juniperus*); cone scales 12 or fewer, decussate.

B. Fruit a bluish berry; leaves often awl-shaped, often scale-like, often both forms on the same plant. JUNIPERUS (p. 26)

BB. Fruit a dry woody cone; leaves all scale-like.

C. Leaves 4 in a whorl; cone-scales of 3 quite unlike pairs; seeds unequally 2-winged. LIBOCEDRUS (p. 26)

CC. Leaves opposite; cone scales alike or nearly so; seeds equally 2-winged.

D. Pistillate cones globose, their scales 4—6 and peltate; staminate cones oblong, their scales ovate and not peltate. THUJA (p. 26)

DD. Pistillate cones oblong, their scales 8—12 and not peltate; staminate cones globose, their scales peltate. CHAMAECYPARIS (p. 27)

AA. Leaves alternate or in bunches of 2—many, sheathed at the base if in 2—5-leaves bunches, linear, not scale-like (except sometimes in *Sequoia*), cone scales more than 12.

E. Leaves of 2 forms; the one lanceolate, flat, 6—13 mm. long; the other ovate or ovate-oblong, keeled, 5—7 mm. long; seeds 5—7 under each scale.

SEQUOIA (p. 27)

EE. Leaves of only 1 form; seeds 2 under each scale.

F. Leaves solitary.

G. Branchlets not roughened by persistent leaf-bases; bracts either longer than the cone-scales, or else shorter and the cones erect and their scales dropping from the axis.

H. Leaves flat or 4-sided, often notched at apex; leaf-scars circular; mature cones erect; scales dropping from the cone-axis; bract usually shorter than the scales. ABIES (p. 27)

- HH. Leaves flat, never notched at apex; leaf-scars transversely oval; mature cone pendulous; scales persistent to the cone-axis; bracts longer than the scales. PSEUDOTSUGA (p. 28)
- GG. Branchlets roughened by persistent leaf-bases; bracts shorter than the cone-scales; cones pedulous; cone-scales persistent on the axis.
- I. Leaves if flat with stomates below, with 1 dorsal resin duct; cone-scales entire, rounded. TSUGA (p. 28)
- II. Leaves if flat with stomates above, with 2 lateral resin ducts or none; cone-scales not entire, or if so not rounded. PICEA (p. 28)
- FF. Leaves in bunches of 2 or more.
- J. Leaves in bunches of more than 5, deciduous, bunches not sheathed at base; cones solitary; pistillate cones maturing at the end of the first season. LARIX (p. 28)
- JJ. Leaves in bunches of 2—5, evergreen, bunches sheathed at base; staminate cones clustered; pistillate cones maturing at the end of the second or third season. PINUS (p. 29)

JUNIPERUS

JUNIPER

Shrubs or trees. Leaves evergreen, sessile, awl-like or scale-like, opposite or in whorls of 3. Flower bunches and berries small. Staminate flower-bunch oblong or ovoid. Anther cells 2—6. Fruit a bluish berry, globose; scales few, opposite or in whorls of 3. Seeds 1—4, wingless, bony. (Celtic name.)

- A. Leaves in whorls of 3, all awl-shaped; buds scaly; cones axillary; pistillate cones with smaller scales at the tip; alpine shrub, prostrate, 1 m. or less tall. W. C. E. (*J. communis sibirica*; *J. nana*; *J. sibirica*)

J. communis L. (Dwarf Juniper)

- AA. Leaves opposite or in whorls of 3; often awl-shaped on young plants, but scale-like on mature plants; buds naked; cones terminal on short axillary branches; pistillate cones with larger scales at the tip; not alpine, erect, shrub or tree, 15 m. or less tall.

- B. Leaves very resinous, dark green. E.

J. occidentalis Hook. (Western Juniper)

- BB. Leaves not resinous, often glaucous. W. E.

J. scopulorum Sarg. (Rocky Mountain Juniper)

LIBOCEDRUS

Trees, evergreen; bark scaly. Leaves 4 in a whorl, scale-like. Cones monoicous, solitary, terminal, the 2 sexes on different branchlets. Staminate cones of 12—16 4-ranked scales with 4 pollen-sacs each. Pistillate cones oblong, maturing in one season; cone-scales 6, not peltate, only 2 fertile, middle pair 2—2½ times as long as lower pair, upper pair resembling a sort of cone-axis. Seeds 2. (Gk. *leibo*=to pour out, *kedros*=cedar; probably on account of the strong cedar-like odor.) U. C.

L. decurrens Torr. (Incense Cedar)

THUJA

ARBOR-VITAE

Shrubs or trees (ours). Leaves small or minute, scale-like, appressed, imbricate, opposite, 4-ranked, those of short branchlets mostly obtuse, those of the most vigorous branchlets mostly acute or acuminate. Cones or aments monoicous, both kinds terminal. Staminate cone-scales opposite; pollen-sacs 2—4, globose. Pistillate cones mostly spreading or recurved, opening when mature; scales 10 or more, coriaceous, opposite, 4 fertile. Seeds 2—5. (Gk. *thuia*=name of similar tree.) W. C. E.

T. plicata Don. (Giant Cedar)

CHAMAECYPARIS

Trees. Leaves minute, opposite, 4-ranked, scale-like or those of older twigs subulate. Cones or aments small, monoicous, terminal. Staminate cones of numerous 4-ranked scales with 2 pollen-sacs each. Pistillate cones closed until mature; scales opposite, 10 or more, peltate, thick, each with a central point or knob. Seeds 2—5. (Gk. chamai=on the ground, kuparissos=cypress; hence low cypress.)

- A. Leafy twigs terete or nearly so; bark 2 cm. or less thick; leaves usually without glands. W. C. *C. nootkatensis* Spach (Alaska Cedar)
 AA. Leafy twigs much flattened; bark 25 cm. or less thick; leaves conspicuously glandular. U. *C. lawsoniana* Murr. (Port Orford Cedar)

SEQUOIA

Trees. Flowers monoicous. Staminate cones small, involucrate with scale-like leaves; anthers 3—5 under each subpeltate scale; pollen not winged. Cones oval, maturing the second year; scales at right angles to the cone-axis, thick. Ovules erect but seeds inverted. Seeds 3—7. (Honor of Sequoyah=George Guess, the inventor of the Cherokee alphabet.) U. *S. sempervirens* Endl. (Redwood)

ABIES

FIR

Trees. Leaves linear, often complanate, scattered, flat. Staminate cones axillary, oval or oblong-cylindric. Mature pistillate cones ovoid or oblong-cylindric, erect; scales incurved at their wide apex, orbicular or wider, deciduous. Seeds 2. (Latin name.)

- A. Most of the leaves of the sterile branches notched at apex.
 B. Bracts conspicuous, reflexed, much exceeding the scales; leaves slightly notched at apex, with stomates on both sides, not markedly complanate; winter buds ovoid-oblong; sap-wood darker than heart-wood. W. C. *A. nobilis* Lindl. (Noble Fir)
 BB. Bracts not projecting beyond the scales; leaves distinctly notched at apex, with stomates beneath only, markedly complanate; winter buds globose; sap-wood lighter in color than heart-wood. W. C. E. *A. grandis* Lindl. (White Fir)
 AA. Most of the leaves of the sterile branches not notched at the apex.
 C. Leaves of sterile branches flat, often grooved above; cones 6.2—15 cm. long; cone-scales narrower than 2.5 cm.
 D. Leaves dark-green and shining above, 1.9—3.1 cm. long; cones dark-purple; cone-scales slightly wider than long; bracts of cone-scales rhombic or oblong-ovate, gradually narrowed into a long tip; bark of old trees 6.2 cm. or less thick. W. C. *A. amabilis* Forbes (Lovely Fir)
 DD. Leaves pale blue-green, 2.5—4.4 cm. long; cones dark-purple; cone-scales longer than wide; bracts of cone-scales rounded, with emarginate and long-pointed tip; bark of old trees 3.7 cm. or less thick. W. C. E. *A. lasiocarpa* Nutt. (Alpine Fir)
 DDD. Leaves pale blue-green, 5—7.5 cm. long on vigorous sterile branches, while on others sometimes only 1.9 cm. long; cones purple or green or yellow; cone-scales much wider than long; bracts of cone-scales obovate, with short tip at apex; bark of old trees 15 cm. or less thick. U. C. E. (*A. lowiana*.) *A. concolor* Parry (Silver Fir)
 CC. Leaves of sterile branches 4-sided, not grooved above; cones 15—23 cm. long; cone-scales 2.5—3.7 cm. wide.
 E. Bracts not projecting beyond the cone-scales, acute to acuminate. U. C. *A. magnifica* Murr. (Shasta Fir)

- EE. Bracts projecting beyond the cone-scales, rounded to obtuse. C.
A. magnifica shastensis Lemm. (Shasta Fir)

TSUGA

HEMLOCK

Trees; branchlets roughened by persistent leaf-bases. Leaves flat or convex or keeled above, linear, scattered, often complanate. Cones solitary, monoicous. Staminate cones globose. Mature pistillate cones ovate-oblong or oval or oblong-cylindric, obtuse, pendulous, nearly sessile; scales thin, suborbicular or ovate-oblong, persistent. Seeds 2. (Japanese name.)

- A. Leaves complanate, flat, with stomates only on the under surface; cones, 1.9—2.5 cm. long. W. C. E. *T. heterophylla* Sarg. (Western Hemlock)
 AA. Leaves not complanate, convex or keeler above, with stomates on both surfaces; cones 1.9—7.5 cm. long. W. C. E.
T. mertensiana Sarg. (Alpine Hemlock)

PSEUDOTSUGA

Trees; branchlets not roughened by persistent leaf-bases. Leaves linear, flat, scattered, obtuse to acuminate, grooved above, often somewhat complanate. Cones solitary. Staminate cones oblong-ovate or cylindric. Mature pistillate cones ovate or oblong, acute, pendulous; scales rounded, rigid, persistent on the cone axis. Seeds 2. (Gk. pseudos=false; Jap. tsuga=hemlock.) W. C. E. (*P. douglasii*; *P. mucronata*.)
P. taxifolia Brit. (Douglas Fir)

PICEA

SPRUCE

Trees. Branchlets roughened by the persistent leaf-bases. Leaves linear, mostly not complanate, 4-angled, scattered. Staminate cones oblong or oval or cylindric, long-stalked. Mature pistillate cones ovoid or oblong-cylindric, pendulous, none on the lower half of the tree; scales thin, obtuse, persistent. Seeds 2. (Latin name.)

- A. Cone-scales entire, broadly ovate, rounded at apex; leaves obtuse, somewhat flat; branchlets pubescent. U. *P. breweriana* Wats. (Weeping Spruce)
 AA. Cone-scales not entire, mostly contracted at both ends; leaves acute or acuminate, 4-sided or somewhat rounded.

- B. Branchlets pubescent; leaves 4-sided, with stomates on 4 sides; cones about 5 cm. long; cone-scales gradually narrowed to an acute or truncate tip; crushed leaves with decided skunk-like smell. C. E.

P. engelmanni Engelm. (Engelmann Spruce)

- BB. Branchlets glabrous; leaves hardly 4-sided, usually with stomates on the upper side only; cones 5—10 cm. long; cone-scales rounded at tip; crushed leaves with little or no skunk-like smell. W.

P. sitchensis T. & M. (Sitka Spruce)

LARIX

LARCH

Trees with numerous knob-like branches on their twigs. Some of the leaves in bunches of 10 or more on the knob-like branches, other leaves scattered on the elongated twigs; leaves all awl-shaped, 3—4-angled. Staminate cones globose or oval or oblong. Mature pistillate cones ovoid-oblong or conical or subglobose, short-stalked; scales slightly thickened, suborbicular or oblong-ovate. Seeds 2. (Celtic name.)

- A. Leaves 3-angled; branchlets and bud-scales pubescent but soon becoming glabrous; cones 2.5—3.7 cm. long. C. E.

L. occidentalis Nutt. (Western Larch)

- AA. Leaves 4-angled; branchlets and bud-scales tomentose; cones 3.7—5 cm. long.
C. E. *L. lyallii* Parl. (Woolly Larch)

PINUS

PINE

Trees or shrubs. Leaves needle-like, all in sheathed bunches of 2—5 or rarely 1 (not ours) on knob-like branches. Staminate cones involucrate. Scales of pistillate cones thickened at tip, woody, tipped with a scar or protuberance. Seeds 2. (Latin name.)

- A. 2 leaves in a bunch.
B. Leaves 2.5—7.5 cm. long, all in 2's; cones 1.5—5 cm. long, remaining on the trees for 5—30 years. W. C. E. (*P. murrayana*; *P. contorta murrayana*).
P. contorta Dougl. (Lodge-Pole Pine)
BB. Leaves 10—27 cm. long, often some in 3's; cones 7.5—37.5 cm. long; cone-scales dropping within 2 years.
C. Cones 7.5—15 cm. long; seeds 6—7 mm. long; leaves persistent for 3 years.
W. C. E. *P. ponderosa* Dougl. (Yellow Pine)
CC. Cones 12.5—37.5 cm. long; seeds 10—12 mm. long; leaves persistent for 6—9 years. U. C. (*P. jeffreyi*).
P. ponderosa jeffreyi Vas. (Jeffrey Pine)
AA. 3 leaves in a bunch.
D. Leaves in 2's or 3's; cones subterminal, falling within 2 years. (See C. or CC.)
DD. Leaves all in 3's; cones lateral, remaining 2—many years. C.
P. attenuata Lem. (Knob-Cone Pine)
AAA. 5 leaves in a bunch.
E. Cones short-stalked (2—7 mm.), 3.7—12.5 cm. long (in *P. flexilis* 7.5—25 cm. long); cone-scales with prickles; thick; seeds longer than their wings (except in *P. balfouriana*); leaves 2.5—7.5 cm. long; bark whitish where smooth.
F. Leaves 2.5—3.7 cm. long, persistent for 10—12 years; old bark divided into isodiametric plates; cones 8.7—12.5 cm. long, opening at maturity; prickles of cone-scales on back and not at very tip, pointing away from cone-axis. U.
P. balfouriana Murr. (Foxtail Pine)
FF. Leaves 3.7—6.2 cm. long, persistent for 5—8 years; old bark divided into elongated plates; cones 3.7—7.5 cm. long, not opening at maturity; prickles on cone-scales at very tip, pointing toward cone-tip. C.
P. albicaulis Engelm. (White-Bark Pine)
FFF. Leaves 3.7—7.5 cm. long, persistent for 5—6 years; old bark divided into isodiametric plates; cones 7.5—25 cm. long, opening at maturity; prickles of cone-scales at very tip, pointing towards cone-tip. C. E.
P. flexilis Jas. (Limber Pine)
EE. Cones long-stalked (1.2—7.5 cm.), 1.5—4.5 dm. long; cone-scales with obsolete prickles or none, thin; seeds shorter than their wings; leaves 3.7—10 cm. long; bark green where smooth (or whitish in *P. monticola*).
G. Cones 1.2—2.8 dm. long; seed $\frac{1}{3}$ as long as its wing; old bark 3.7 cm. or less thick, broken into isodiametric plates; smooth younger bark whitish. W. C. E. *P. monticola* Don. (Western White Pine)
GG. Cones 3—4.5 dm. long; seed $\frac{1}{2}$ as long as its wing; old bark 7.5 cm. or less thick, broken into elongated plates; smooth younger bark greenish. C.
P. lambertiana Dougl. (Sugar Pine)

Angiosperms (Ovary Plants)

MONOCOTYLEDONS

TYPHACEAE

Cat-tail Family

Perennial; roots fibrous; stems simple, terete. Leaves alternate, linear or strap-shaped, sheathing at base, flat, more or less convex on the back, parallel-veined. *Flowers* in terminal *spikes*, the staminate above the pistillate. Staminate flowers among hairs. Stamens 1—7; pollen-grains often in 4's. *Perianth* of several delicate silky and simple or clavate *hairs*. Ovary usually 1-celled, somewhat stalked; ovule 1; style long.

TYPHA

CAT-TAIL

Marsh plants. (Greek name.)

- A. Spikes with staminate and pistillate portions separated; pollen of simple grains; fruiting pedicels rigid, 1 mm. or less long. W. E.

T. angustifolia L. (Narrow-leaved Cat-tail)

- AA. Spikes with staminate and pistillate portions contiguous; pollen grains in 4's; fruiting pedicels bristle-like, 2—3 mm. long. W. C. E.

T. latifolia L. (Common Cat-tail)

SPARGANIACEAE

Bur-reed Family

Roots fibrous; stems erect or immersed and floating. Leaves linear, alternate, flat or more or less equitant below, sheathing at base. *Flowers* sessile or peduncled, in *heads*, staminate heads above the pistillate. *Perianth* of 3—6 chaffy scales. Stamens mostly 5. Pistils 1, or 2 with united styles and ovaries. Fruit 1-celled, 1-seeded.

SPARGANIUM

BUR-REED

Marsh plants. (Gk. sparganon=a band; referring to the ribbon-like leaves.)

- A. Inflorescence branched; stems erect, never floating.
B. Lower branches with 2—6 staminate heads, main axis with 6—10; akenes almost as wide as long, truncate or depressed at the summit; sepals erose at tip. C. E.

S. eurycarpum Engelm.

- BB. Lower branches with 6—10 staminate heads, main axis with 10—17; akenes decidedly longer than wide, rounded at the summit; sepals entire at tip. W. E.

S. androcladum Mor., (Branched Bur-reed)

- AA. Inflorescence simple; stems erect or floating.

- C. Stems erect, stout; at least the middle leaves strongly triangular-keeled; mature pistillate heads about 25—31 mm. in diameter. W. C. E.

S. simplex Huds. (Simple Bur-reed)

- CC. Stems erect or floating, slender; leaves not keeled or only slightly so; mature pistillate heads 16—20 mm. in diameter. W.

S. multipedunculatum Rydb.

- CCC. Stems floating, slender; leaves not keeled; mature pistillate heads 10—15 mm. in diameter.

- D. Anthers 3—4 times as long as thick; mature pistillate heads about 15 mm. in diameter; akenes fusiform; beak of akene 2 mm. long. W.

S. angustifolium Michx.

- DD. Anthers twice as long as thick; mature pistillate heads about 10 mm. in diameter; akenes broadly ellipsoid or obovoid; beak of akene long. W. C. E.

S. minimum Fries (Floating Bur-reed)

NAIADACEAE

Pond-weed Family

Aquatic or marsh herbs, *mostly immersed*, with rootstocks. Leaves alternate or opposite, sometimes all basal, flat or terete above the stipular or sheathing base; blade usually present, usually entire, rarely toothed or none; reduced leaves various in shape. Flowers perfect or unisexual, solitary or clustered in the leaf-axils, or spirally arranged in a spike, or borne on a 1-sided spadix, often with a spathe; pistillate flowers rarely of 2 forms. Perianth none or of 4—6 distinct segments, or membranous and tubular or cup-shaped. Stamens 1—2 or 4—6, filaments very short or none. Carpels 1—6, 1-celled, usually 1-ovuled, distinct or united; ovary superior; style present or none. Fruit drupelets or nutlets or utricles.

- A. Growing in fresh water, or in salt marshes, but not in open tide-water.
- B. Leaves flat, in a few species terete, but then never more than 1.5 mm. in diameter; stem elongated.
- C. Leaves alternate, often wide, more than 25 mm. long when linear; pistil 1.
 - D. Leaves all linear, all alternate; stamens 2; connectives of the anthers not dilated; fruit stalked. RUPPIA (p. 31)
 - DD. Often with some wide leaves, often the upper leaves opposite; stamens 4; connectives of the anthers dilated and perianth-like; fruit sessile. POTAMOGETON (p. 32)
- CC. Leaves opposite or in whorls of 3, all linear, 8—25 mm. long; pistils more than 1.
- E. Leaves not spiny; pistils 2—10.
 - F. Flowers perfect, in spikes or clusters; stamens more than 1. POTAMOGETON (p. 32)
 - FF. Flowers monoicous, axillary; stamen 1. ZANNICHELLIA (p. 31)
 - EE. Leaves spiny on the margin or the back or both; flowers solitary in the leaf-axils; pistil 1. NAIAS (p. 33)
- BB. Leaves terete, 1—45 mm. in diameter, all basal; stem not elongated. LILAEA (p. 34)
- AA. Growing along tide-water shores from 1 m. above low tide to 2 m. below it, not in salt marshes.
 - G. Plants growing on muddy bottom; leaves 3—15 mm. wide; flowers monoicous; mature fruit rounded at base; seeds often ribbed. ZOSTERA (p. 33)
 - GG. Plants growing mostly in rock crevices; leaves 4 mm. or less wide; flowers dioicous; mature fruit deeply cordate-sagittate at base; seeds not ribbed. PHYLLOSPADIX (p. 33)

ZANNICHELLIA

HORNED POND-WEED

Submerged. Leaves entire, 1-veined; stipules sheathing the leaf-bases or free. Flowers enclosed in a deciduous hyaline spathe. Staminate flowers of a single anther on a short filament. Pistillate flowers 2—5; pistils 2—10, flask-shaped, tapering into a short recurved style. Mature fruit a nutlet. (Honor of G. G. Zannichelli, a botanist of Venice.) E. Z. palustris L. (Zannichellia)

RUPPIA

DITCH-GRASS

Submerged. Leaves entire, 1-veined, acute, wider and sheathed at base; stipular sheath clasping the leaf-bases. Flowers terminating a spadix-like peduncle which elongates and coils about the time the flower opens. Stamens 2. Pistils 4, at first sessile, at length

stalked; stigmas peltate, sessile or not. Mature fruits on long umbellate pedicels which recoil after the fruits drop. (Honor of H. B. Ruppius, a German botanist.)

A. Stipular sheath 10 mm. or less long, its free part shorter; fruit 2 mm. long. W.
R. maritima L. (Marine Ditch-grass)

AA. Stipular sheath 15 mm. or more long, its free part as long; fruit 3—4 mm. long.
 C. *R. occidentalis* Wats. (Western Ditch-grass)

POTAMOGETON

POND-WEED

Stems submerged or floating, the end often thickening and forming a propagating bud which falls off and strikes root. Leaves either all submerged or some floating and some submerged, in some species varying greatly in length and width; floating leaves coriaceous or semi-coriaceous, rarely semi-pellucid, usually expanded into a proper blade; submerged leaves sometimes greatly reduced, or with broad or capillary leaf-blades; stipules present. Flowers usually thickly clustered on the simple or branched spike. Stamens 4. Pistils 4. Fruit sessile. In fresh water (except sometimes *P. pectinatus*). (Gk. potamos—a river, geiton—a neighbor; referring to the habitat.)

A. With both floating and submerged leaves (floating rarely wanting in *P. heterophyllus* and *P. alpinus*), floating leaves broad.

B. Mature submerged leaves narrowly linear to linear-lanceolate, never more than 4 mm. wide.

C. Stipules more than 3 cm. long, acute; submerged leaves 10—25 cm. long, terete, scarcely 1.5 mm. thick. W. C. E.

P. natans L. (Common Pond-weed)

CC. Stipules less than 3 cm. long, acute, submerged leaves 6—14 cm. long, linear to linear-lanceolate, 2.5—4 mm. wide. W. (*P. nuttallii*.)

P. epihydus Raf.

BB. Mature submerged leaves wider or spatulate, never linear nor less than 4 mm. wide (except in forms of *P. heterophyllus*).

D. Floating leaves 32—40-veined; submerged leaves of 2 kinds, the one falcate and the other oval. W. C. E.

P. amplifolius Tuck.

DD. Floating leaves fewer-veined; submerged leaves of 1 kind only (except in *P. pulcher*, and in that none falcate).

E. Submerged leaves more than 7-veined, all petioled.

F. Bases of floating leaves merely rounded or acute, not cordate; submerged leaves as wide or nearly as wide as the floating; style 1.5 mm. long. W. E. (*P. americanus*.) *P. lonchitis* Tuck.

FF. Bases of floating leaves cordate or subcordate; submerged leaves much narrower than the floating; style 2 mm. or more long. C.

P. pulcher Tuck.

EE. Submerged leaves mostly 7-veined, at least the lowest sessile.

G. Plants green; submerged leaves narrower than the floating ones; 1—2 carpels of each flower maturing. C. E.

P. heterophyllus Schreb. (Variable Pond-weed)

GG. Plants red; submerged leaves as wide or wider than the floating ones; 3—4 carpels of each flower maturing. C. E.

P. alpinus Balb. (Mountain Pond-weed)

AA. With submerged leaves only.

H. Leaves lanceolate or wider, not linear.

I. Leaves petioled or merely sessile, not clasping at base; spike 4 cm. or more long.

E. *P. lucens* L. (Shining Pond-weed)

- II. Leaves perfoliate or somewhat clasping at base; spike 3 cm. or less long.
- J. Leaf-tip cucullate; leaves lanceolate or lanceolate-oblong. W.
P. praelongus Wolfg. (White-stem Pond-weed)
- JJ. Leaf-tip not cucullate; leaves orbicular or ovate or ovate-lanceolate. W. C.
 E. (*P. perfoliatus richardsonii*)
P. perfoliatus L. (Clasping Pond-weed)
- HH. Leaves all linear.
- K. Stipules adnate to the leaf-bases.
- L. Leaves not capillary, 2.5—4 mm. wide, margin minutely serrulate thruout; free part of stipule longer than sheath. W. E.
P. robbinsii Oakes
- LL. Leaves capillary, 0.1—0.3 mm. wide, margin entire; free part of stipule shorter than sheath. W. E.
P. pectinatus L. (Fennel-leaved Pond-weed)
- KK. Stipules free from the leaf-bases, axillary.
- M. Leaves linear, 2—4 mm. wide, 5—20 cm. long, without glands at base; stipules 1—3.5 cm. long; plants mostly with propagating buds. W. (*P. compressus*).
P. zosterifolius Schum.
- MM. Leaves linear or capillary, 0.1—1.5 mm. wide, 2—12 cm. long, with 2 small glands at base; stipules 0.5—1.5 cm. long; plants with propagating buds. W. E. *P. pusillus* L. (Small Pond-weed)
- MMM. Leaves linear, 0.4—2 mm. wide, 1.5—8 cm. long, without glands at base; stipules 1.3—2.4 cm. long; plants nearly always without propagating buds. E. (*P. californicus*; *P. foliosus californicus*).
P. foliosus Raf.

ZOSTERA

EEL-GRASS

Stem much branched. Leaves in 2 rows, flat, 4—13 dm. long (ours), somewhat like those of the cat-tail. Flowers perfect, monoicous (ours). Style long. Mature fruit a cylindric or flask-shaped utricle, rounded at base. On muddy bottom, in quiet tide-water, submerged. (Gk. *zoster*=a belt; referring to the leaves.) W.

Z. marina L. (Eel-grass)

PHYLLOSPADIX

SEA BASKET-GRASS

Stem slender. Leaves grass-like. Flowers dioicous, each covered by hyaline envelope. Style short. Mature fruit coriaceous, indehiscent, deeply cordate-sagittate at base. Seeds membranous, globose. On rocky shores subjected to strong tidal currents, about the low-tide line. (Gk. *phyllon*=leaf, *+spadix*; inflorescence enclosed in leaf-base.)

A. Leaves flat, 2—4 mm. or more wide; peduncles basal, simple, solitary or in 2's, 1—5 cm. long. W. *P. scouleri* Hook.

AA. Leaves complicate, 0.7—1.5 mm. or less wide; peduncles cauline, mostly branched, in 2's or 3's, mostly 3—14 cm. long. W.

P. torreyi Wats.

NAIAS

WATER-NYMPH

Submerged marine or fresh-water herbs; roots fibrous; stems slender, branching, unarmed or spiny. Leaves alternate or opposite or whorled; blade linear, spiny on margin or back or both, acute or obtuse, sometimes tipped with one or more subulate spines, sheathing at base; leaf-sheath rounded or auriculate, entire or spinulose-toothed. Flowers monoicous or dioicous, solitary in the axils. Perianth-like envelope of the stam-

inate flowers double, the inner hyaline, the outer 4-horned or entire. Stamen 1. Pistillate flowers merely of 1 pistil. Style short or none; stigmas 2—4, sometimes also 1—3 stigma-like processes present. Fruit a sessile drupelet. Seed 1. (Gk. *naias*=a water-nymph; referring to the habitat.)

A. Marginal teeth of leaves prominent; anthers 1-celled; seeds apparently smooth and shining, but under strong lens reticulate with minute 6-sided areas. W.

N. *flexilis* R. & S. (Slender Water-nymph)

AA. Marginal teeth of leaves inconspicuous or none; anthers 4-celled; seeds reticulate with 4-sided areas. W. E. N. *guadalupensis* Mor. (Thread-like Water-nymph)

LILAEA

Acaulescent, annual, in shallow marshes of fresh or salty water. Leaves all basal, 1—4.5 mm. in diameter (ours); terete above the stipular sheath. Flowers perfect or unisexual, either basal or in scapose spicate inflorescences which are naked or bracted. Perianth none. Basal flowers enclosed by the sheathing leaf-bases, exclusively pistillate; carpel 1, 1-seeded; style long, slender; stigma capitate. Scapose inflorescence of staminate and pistillate and perfect flowers irregularly disposed in a spike. Stamen 1. Stigmas papillose. Fruit ribbed or winged. Perfect flowers with stamens and pistils like those in unisexual flowers, but united at base. W.

L. *subulata* H. & B.

JUNCAGINACEAE (Scheuchzeriaceae) Arrow-grass Family

Perennial *marsh herbs*. Leaves rush-like; blades terete or half-terete at least near their base. Flowers perfect, in spikes or racemes. *Perianth* 3—6-parted, in 2 very similar series. Stamens 3—6, on the base of the perianth (ours). Carpels 3—6, 1—2-ovuled, more or less united until maturity. Fruit a capsule or follicle. Stigmas sessile or nearly so. Seeds 1—2 in each carpel.

A. Leaves all basal; flowers numerous, bractless, in a spike or spike-like raceme; anthers oval; stigmas plumose.

TRIGLOCHIN (p. 34)

AA. Stem leafy; flowers few, bracted, in loose racemes; anthers linear; stigmas papillose or slightly fimbriate.

SCHEUCHZERIA (p. 34)

TRIGLOCHIN

ARROW-GRASS

Leaves half-terete, ligulate, with membranous sheaths. Perianth-segments 3—6, concave, the three inner ones inserted higher up than the outer ones. Stamens 3—6. Ovaries 3—6, united, 1-celled, sometimes abortive, 1-ovuled. Fruit of 3—6 cylindric or oblong or obovoid carpels; carpels distinct or united, coriaceous, costate, when ripe separating from the base upward from a persistent central axis. In wet and often salty places. (Gk. *treis*=3, *glochis*=point; referring to fruit of some species.)

A. Leaves flat; pedicels 5—7 mm. long; carpels 3; fruit linear or clavate, tapering to a subulate base. E. T. *palustris* L. (Marsh Arrow-grass)

AA. Leaves half-cylindric; pedicels 2—4 mm. long; carpels 6; fruit oblong or ovoid, obtuse at base. W. C. E. T. *maritima* L. (Seaside Arrow-grass)

SCHEUCHZERIA

Rush-like with creeping rhizomes and erect stems. Leaves elongate, half rounded below, flat above, striate; leaf-sheath membranous, ligulate. Flowers small. Perianth 6-parted, regularly 2-whorled, persistent. Stamens 6. Ovaries 3, rarely 4—6, distinct

or united at the base, 1-celled, 1—3-ovuled. Carpels divergent, inflated, coriaceous, 1—2-seeded, follicle-like. (Honor of J. and J. J. Scheuchzer, Swiss botanists.) W. C. E.
S. palustris L.

ALISMACEAE

Water-plantain Family

Aquatic or marsh herbs, annual or perennial, acaulescent. Leaves basal; petiole elongate, sheathing at base; blades flat, several-ribbed, often with spreading or deflexed lobes. Scapes erect or floating, with simple or branched inflorescence. Flowers perfect or unisexual, regular, whorled, borne in terminal racemes or panicles. Calyx of 3 persistent green sepals. Corolla white or pink, of 5 deciduous imbricate petals. Stamens 6 or more. Carpels few—many, distinct, whorled capitate. Fruit a head or whorl of flat or turgid akenes.

A. Leaves not sagittate, altho sometimes cordate at base; flowers in compound panicles, perfect; akenes in a whorl; receptacle depressed. ALISMA (p. 35)

AA. Leaves sagittate; flowers in whorls or 3 near the top of the scape, monoicous or dioicous; akenes in a head; receptacle convex to globose. SAGITTARIA (p. 35)

ALISMA

WATER-PLANTAIN

Annual or perennial, scapose. Leaves erect or floating; leaf-blades several-veined, without basal lobes but sometimes cordate, gradually or abruptly narrowed into petiole. Sepals wide, usually ribbed. Petals white or pinkish, spreading. Stamens 6, 2 opposite each petal. Carpels few—many. Akenes in 1 depressed discoid whorl, ribbed or grooved on the back. Ours in marshes and along ponds and lakes. (Celtic alis=water; referring to habitat.)

A. Petals white, 5—6 mm. long; peduncles and pedicels straight, ascending; akenes obovate, 3—5 mm. long, grooved on the back, the inner edges not meeting within the whorl. W. C. E. (*A. brevipes*.)

A. plantago-aquatica L.

AA. Petals pink, 2—4 mm. long; peduncles and pedicels recurved; akenes suborbicular, about 2 mm. in diameter, ridged on the back, the inner edges meeting within the whorl. E.

A. geyeri T. & H.

SAGITTARIA

ARROW-HEAD

Perennial, either more or less emersed and erect, or else submerged and floating; rhizome irregularly thickened or tuber-bearing. Leaves various, of petiole and blade or much reduced, those not submerged strikingly arrow-head-like (in ours). Scapes sometimes greatly elongated, usually simple at least below the inflorescence. The lower whorl of flowers usually pistillate, the upper usually staminate. Staminate flowers with several—many stamens. Pistillate flowers with many distinct carpels. Akenes numerous, flat, beaked, densely crowded in globular heads. Ours in ponds and at lake-margins. (*L. sagitta*=arrow; referring to leaf-form.)

A. Bracts of the inflorescence ovate-lanceolate or narrower, acuminate; fruit-heads 1—1.5 cm. in diameter; beak of akene erect, less than $\frac{1}{4}$ its length. C. E. (*S. arifolia stricta*; *S. cuneata*.) *S. arifolia* Sm. (Floating Arrow-head)

AA. Bracts of the inflorescence ovate, acute or obtuse; fruit-head 1.5—3 cm. in diameter; beak of akene horizontal or oblique, more than $\frac{1}{4}$ its length. W. C. E.

S. latifolia Willd. (Wapato)

HYDROCHARITACEAE (Vallisneriaceae)**Water-weed Family**

Perennial, *submerged* (ours) or *floating*, with rhizomes or stolons, sometimes acaulescent (not ours). *Leaves opposite or whorled* (in ours), or fascicled. Flowers of 1—3 usually more or less united bracts, enclosed in a spathe, dioicous or polygamous. Calyx in the pistillate flowers usually well developed, usually tubular; in the staminate flowers often short or obsolete. *Perianth regular* or nearly so; *sepals* 3; *petals* 3; often rudimentary or wanting. Stamens 3—12; filaments short or none, sometimes monadelphous. Pistil 1, compound; ovaries 1-celled, with 2—5 but usually 3 parietal placentae. Fruit indehiscent, maturing under water. Seeds few—many.

PHILOTRIA (Elodea, Anacharis) WATER-WEED

Stem elongated. Leaves sessile, pellucid, 1-veined, oblong or ovate-oblong, usually obtuse, in ours 5—10 mm. long and 2—4 mm. wide, margin usually minutely denticulate or serrulate. Flowers rarely perfect. Staminate flowers solitary or in 3's, sessile or nearly so, early separating from the plant and floating on the water; stamens 9. Pistillate flowers solitary, sessile, calyx prolonged as a long slender tube; stamens none, or 3 rudiments. Fruit linear or lance-linear; seeds 3—21. (Gk. *phyllon*=leaf, *treis*=3; leaves are often in 3's.) W. E.

P. canadensis Brit.

GRAMINACEAE (Poaceae) Grass Family

Herbs (ours), annual or perennial; *stems terete*, usually *hollow*, their joints closed. Leaves sheathing, with scarious ring (ligule) where blade joins sheath; *sheath* usually *split* to base on side opposite the blade. Inflorescence paniculate or racemose or spicate or head-like, but the elements of the inflorescence composed of flower-groups (spikelets) of 1 to many flowers. *Spikelets composed of 0—2 basal flowerless bracts* (glumes), *above which are other bracts usually in pairs* (the outer=lemma, the inner=palet) and *each pair enclosing a flower or an abortive one*. Lemma and glume often awned. Palet with back to axis (rachilla) of spikelet, opposite its lemma and often rolled up in it. Stamens 1—6, usually 3; *anthers versatile*. Ovary 1-celled, 1-ovuled; styles 1—3, usually 2 and lateral; stigmas plumose or hairy. *Fruit a grain* (ours).

A. Spikelets 1-flowered, rarely 2-flowered, terete or dorsally compressed (laterally in *Oryzae*), falling entire and singly or in groups or together with joints of the rachis; imperfect flower below in the 2-flowered spikelets; rachilla articulate below the glumes, not produced beyond the flowers.

B. Glumes 1—2; spikelets terete or dorsally compressed, 1—2-flowered.

C. Glumes indurated; lemma and palet of fertile flower hyaline; stamen 1.

ANDROPOGONEAE (p. 37)

CC. Glumes membranous; lemma and palet of fertile flower indurated; stamens 3.

PANICEAE (p. 37)

BB. Glumes none; spikelets much laterally compressed, 1-flowered.

ORYZAEAE (p. 39)

AA. Spikelets 1 to many flowered, more or less laterally compressed; rachilla and glumes remaining after the grain has fallen; imperfect flower uppermost (except *Hierochloe*) in spikelets of 2 or more flowers; rachilla usually articulate above the flowers.

D. Spikelets not in rows.

E. Spikelets 1-flowered; in racemes or spikes or panicles.

F. Spikelets with 2 sterile lemmas just above the glumes. PHALAREAE (p. 39)

FF. Spikelets without sterile lemmas just above the glumes.

AGROSTAEAE (p. 40)

EE. Spikelets 2 to many flowered, in racemes or panicles.

G. Glumes usually longer than the first flower; 1 or more of the lemmas awned on the back or between the teeth of the bifid apex.

AVENEAE (p. 50)

GG. Glumes shorter than the first flower; lemma either awnless, or with 1 to several terminal straight or merely divergent awns. FESTUCEAE (p. 53)

DD. Spikelets in 2 rows.

H. Spikelet-rows on same side of rachis, forming 1-sided spikes.

CHLORIDEAE (p. 67)

HH. Spikelet-rows on opposite sides of rachis, forming balanced spikes.

HORDEAE (p. 68)

ANDROPOGONEAE (SUGAR-CANE TRIBE)—Spikelets 1—3 at each joint of the rachis, sessile or short-pedicelled, usually 3-flowered. Glumes 2, thicker than the lemmas. Lemma often hyaline, often awned, the lower often empty and glume-like. Palet usually shorter than its lemma, sometimes none. Stamens 1—3. Stigma plumose. Grain unfurrowed, free (ours).

A. Spikelets in a spike-like panicle, in 2's, all fertile; lemma awnless; stamens 1—2.

IMPERATA (p. 37)

AA. Spikelets in a loose somewhat spreading panicle, in 3's, lateral 2 sterile, central 1 fertile; lemma awned; stamens 3.

SORGHUM (p. 37)

IMPERATA

Perennial. Spikelets in a spike-like panicle, usually in pairs (so in ours). both perfect. Glumes awnless, hairy; hairs thin, 12 mm. long (ours). Lemmas hairless, awnless, upper smaller than the lower. Palets usually truncate and jagged at tip. Stamens 1—2. (Origin ?) E.

I. hookeri Rupr. (Western Blade-grass)

SORGHUM

Annual or penennial (ours), 9—20 dm. high (ours). Leaves long, wide, flat, 4—6 mm. wide (ours), appressed-pubescent (ours). Spikelets in a large terminal panicle, in pairs at its nodes or in 3's (ours) at the ends of its branches, 1 sessile and perfect at each node, the lateral 1 or 2 pedicelled and staminate or empty. Glumes shining. Lemma hyaline, awned; awn 8—16 mm. long (ours). Palet hyaline or none. Stamens 3. (Sorghum—the name in India.) W.

S. halapense Pers. (Johnson-grass)

PANICEAE (MILLET TRIBE)—Spikelets in spikes or racemes or panicles, falling off singly from the ultimate branches; fertile spikelet with 1 terminal pistillate flower, with or without a staminate one below it. Glumes rarely awned, the awn straight. Lemma and palet firmer than the glumes, unawned in most. Stamens 3, rarely fewer. Grain enclosed, free, unfurrowed.

A. Spikelets in 1-sided spikes or spike-like racemes.

B. Lemmas not awned; glumes not spiny-hispid, hence spikes or spike-like racemes not bristly.

C. Annual; lower glume very small; lemma with hyaline margin, not inrolled.

SYNTHERISMA (p. 38)

- CC. Perennial; glumes equal or nearly so; lemmas without hyaline margin, inrolled. PASPALUM (p. 38)
- BB. Sterile lemma awned; glumes spiny-hispid, making the spike-like racemes somewhat bristly. ECHINOCHLOA (p. 38)
- AA. Spikelets in open panicles, or if in a spike-like panicle this not 1-sided.
- D. Spikelets without an involucre of bristles, in an open panicle. PANICUM (p. 38)
- DD. Spikelets with an involucre of bristles, clustered in a single dense terminal spike-like panicle. CHAETOCHLOA (p. 39)

SYNTHERISMA (Digitaria)

FINGER-GRASS

Annuals. Spikelets in 2 to several spike-like racemes which are digitate or approximate at the summit of the stem, solitary or in 2's or 3's, 1-flowered, sessile or short-pedicelled, lance-elliptic. Rachis narrow or winged. Glumes 1—3-veined, the first sometimes obsolete. Sterile lemma 5-veined; fertile lemma leathery-indurated, papillose-striate, not inrolled, hyaline margined, enclosing palet. Palet of same texture as glume. (Gk. syn=with, therismos=crop; hence crop-making.) W. E. (*Panicum sanguinale*.) S. *sanguinale* Dulac. (Crab-grass)

PASPALUM

Perennial. Spikelets 1-flowered, not awned, on short pedicels, usually plano-convex, in 1—2 simple or double rows, forming 1-sided spikes. Spikes solitary, or in pairs or panicles. Glumes 2, equal or nearly so. Lemma enclosing palet, roundish or ovate. Palet firm, nearly flat. Stamens 3. Rachis not jointed, flattish or filiform. (Gk. *paspalós*=millet.) E. P. *distichum* L. (Joint-grass)

PANICUM

PANIC-GRASS

Annual or perennial. Spikelets in panicles, rarely in spikes, 1—2-flowered, when 2-flowered the lower 1 staminate only. Glumes 2, very unequal, the first minute, the second subequalling the sterile lemma. Fertile lemma firm, awnless, margin inrolled, veins obsolete; sterile lemma often enclosing a hyaline palet and a staminate flower. Fertile palet like the fertile lemma in texture and veining. Stamens 3. Stigmas plumose. (Latin name of the Italian millet.)

- A. Spikelets acute to acuminate; plants annual.
- B. Stems 1.5—2.5 dm. high, slender; spikelets 2.5 mm. long. W. E.
P. *barbipulvinatum* Nash
- BB. Stems 3—6 dm. high, stout; spikelets 2.5 mm. long. E.
P. *capillare* L. (Old-witch Grass)
- BBB. Stems 4—6 dm. high, stout, spikelets 3.5 mm. long. E.
P. *hirticaulum* Presl. (Rough Panic-grass)
- AA. Spikelets obtuse; plants perennial.
- C. Spikelets 1.5 mm. long; stem slender; ligule 2—5 mm. long. W. C. E. (P. *dichotomum* and P. *pubescens* of How. Fl.)
P. *occidentale* Scribn. (Hairy Witch-grass)
- CC. Spikelets 3.2—3.3 mm. long; stems stout; ligule 1 mm. long. W. E. (P. *scoparium* of How. Fl.) P. *scribnerianum* Nash

ECHINOCHLOA

Annual, coarse. Spikelets in racemes and these in panicles, 1-flowered, sometimes a staminate flower below the perfect terminal one, nearly sessile. Racemes stout,

terminal, 1-sided. Glumes unequal, spiny, hispid, mucronate, margin inrolled except at tip where palet is not included. Sterile lemma similar to glumes, awned from apex or sometimes mucronate only, enclosing a hyaline palet. Fertile lemma and palet chartaceous, acuminate. (Gk. echinos=a hedgehog, chloa=grass; referring to the bristling awns.) W. E. (*Panicum crus-galli*.)

E. crusgalli Beauv. (Barnyard Grass)

CHAETOCHLOA (Setaria)

FOX-TAIL

Annual, erect. Leaves flat. Inflorescence terminal, a spike-like panicle. Spikelets 1-flowered, but with a staminate or neutral one below, jointed with the pedicel, awnless, but rachilla with few to many persistent awn-like branches below the joint. Glumes 2, membranous; lower glume the smaller. Lemma of sterile flower larger than or equaling the upper glume, membranous; lemma of fertile flower firm. Palet of fertile flower of same texture as its lemma. Stamens 3. (Gk. chaeta=a bristle, chloa=grass; referring to the bristly spikes.) W. E.

C. viridis Scribn. (Green Fox-tail)

ORYZAE (RICE TRIBE)—Spikelets flat, with 1 terminal unisexual or perfect flower enclosed by a lemma and a palet; palet usually 1-veined. Glumes none (ours) or 2. Stamens frequently 6. Grain furrowed.

HOMALOCENCHRUS

Perennial. Spikelets in loose panicles, perfect or sterile. Lemma boat-shaped, awnless, clasping the palet by a pair of strong marginal veins. Palet of texture like lemma, 1-veined, much narrower. Stamens 1—6 (3 in ours). (Gk. omalos=resemblance, kenchros=millet; hence millet-like.) W. E.

H. oryzoides Poll. (Rice Cut-grass)

PHALAREAE (CANARY-GRASS TRIBE)—Leaf-blades flat (ours). Spikelets of 1 perfect flower with 2 sterile or staminate lemmas below it and falling attached to it. Palet 0—2-veined, enclosed in fertile lemma. Stamens 2—3. Stigmas plumose. Grain unfurrowed, enclosed, free.

A. Spikelets in spike-like or head-like clusters.

B. Glumes equal; sterile lemmas awnless; stamens 3; plant not sweet-scented.

PHALARIS (p. 39)

BB. Glumes unequal, lower about $\frac{1}{2}$ the upper; sterile lemmas awned; stamens 2; plant markedly sweet-scented.

ANTHOXANTHIUM (p. 40)

AA. Spikelets in loose panicles.

C. Plant not sweet-scented; spikelets 1-flowered; sterile lemmas subulate.

PHALARIS (p. 39)

CC. Plants strongly sweet-scented; spikelets 3-flowered, the lower 2 flowers staminate; staminate lemmas boat-shaped.

HIEROCHLOE (p. 40)

PHALARIS

CANARY-GRASS

Annual or perennial. Inflorescence a head, or a spike-like or narrow panicle. Spikelets flat. Glumes boat-shaped, much exceeding the flower. Sterile lemmas small, narrow, appearing like hairy scales attached to the fertile flower; fertile lemma indurated and shining in fruit, enclosing a faintly 2-veined palet. Stamens 3. Grain oblong, smooth. (Gk. phalaros=brilliant; referring to the shining seed.)

- A. Inflorescence head-like or spike-like, 1—10 cm. long; lower glume with a widely or narrowly winged keel.
- B. Inflorescence an ovoid head-like cluster; lower glume very wide, with keel widely winged. E. *P. canariensis* L.
- BB. Inflorescence an oblong spike-like cluster; lower glume not strikingly wide, with keel narrowly winged above the middle. W.
P. amethystina Trin. (Purple Canary-grass)
- BBB. Inflorescence a cylindric spike-like cluster; lower glume not strikingly wide, with keel widely winged. U. E.
P. caroliniana Walt. (Southern Canary-grass)
- AA. Inflorescence a narrow panicle but too often to be head-like or spike-like, 10—20 cm. long; lower glume not winged. C. E.
P. arundinacea L. (Reed Canary-grass)

ANTHOXANTHIUM

Annual or perennial, sweet-scented. Inflorescence a spike-like panicle. Spikelets narrow, slightly compressed, pedicelled. Glumes very unequal, the lower smaller, acute (ours) to short-awned, persistent. Sterile lemmas 2-lobed, hairy, usually awned, longer than the fertile flower; fertile lemma truncate, with 3 quite delicate veins, awnless, its palet faintly 1-veined. Stamens 2. Stigmas plumose. (Gk. anthos=flower, xanthos=yellow.) W.
A. odoratum L. (Sweet Vernal-grass)

HIEROCHLOE (Savastana)

HOLY-GRASS

Perennial, aromatic. Inflorescence a panicle, open (ours) or somewhat contracted. Spikelets with 1 perfect and 2 staminate flowers. Glumes subequal, about the length of the spikelet, boat-shaped, shining, acute, glabrous, obscurely 1—3-veined. Sterile lemmas nearly as long as the glumes, boat-shaped, indurated, hairy, obtuse or emarginate or bifid, the chief vein often prolonged as a short awn, each enclosing a 2-veined hyaline palet and 3 stamens; fertile lemma hairy at apex, 5-veined, obtuse, often short-awned, enclosed 1-veined palet and perfect flower with 2 stamens. (Gk. hieros=holy, chloe=grass; strewn before church doors on saints' days in Europe.)

- A. Leaves 2—7 mm. wide, 0.2—2 dm. long; glumes 4 mm. long, acuminate. E.
H. odorata R. & S. (Vanilla-grass)
- AA. Leaves 9—13 mm. wide, 3—5 dm. long; glumes 5 mm. long, obtuse. W.
H. macrophylla Thurb. (Large Vanilla-grass)

AGROSTEAE (TIMOTHY TRIBE)—Spikelets with 1 perfect flower. Rachilla sometimes prolonged beyond the palets into a naked or plumose bristle. Glumes 2 (none in *Coleanthus*), subequal or unequal, usually as long as the lemma or longer. Palet veinless or 2-veined, but 1-veined in *Cinna* and wanting in some species of *Agrostis*. Grain unfurrowed.

- A. Plants 2—8 cm. high; glumes none; spikelets hardly 1 mm. long.

COLEANTHUS (p. 43)

- AA. Plants taller; glumes present; spikelets longer.

- B. Inflorescence a dense spike-like (timothy-like) cluster.

- C. Lower glume 4—6 times as long as the lemma not considering awn, and at least a half longer than the upper glume; glumes awnless; lemma-awn terminal, 3—5 mm. long.

GASTRIDIVM (p. 45)

- CC. Not as above in all characters.

- D. Lemma with a terminal awn 0.5—10 mm. long.

- E. Lemma with a tuft of hair at base as long as the lemma. MUHLENBERGIA (p. 43)
- EE. Lemma without a tuft of hair at base. POLYPOGON (p. 43)
- DD. Lemma awnless or with a dorsal awn.
- F. Lemma with a tuft of hair at base. CALAMAGROSTIS (p. 45)
- FF. Lemma without a tuft of hair at base, though often ciliate on the keel.
- G. Glumes not conspicuously compressed-keeled; inflorescence distinctly lobed and raceme-like. AGROSTIS (p. 47)
- GG. Glumes conspicuously compressed-keeled; inflorescence a dense terete spike not or hardly lobed.
- H. Lemma with a dorsal awn 2—16 mm. long; glumes united for $\frac{1}{4}$ — $\frac{1}{2}$ their length at base. ALOPECURUS (p. 47)
- HH. Lemma awnless; glumes not united. PHLEUM (p. 49)
- BB. Inflorescence either plainly a panicle or if spike-like the spikelets distant and thus the spike not dense.
- I. Lemma with a terminal awn 0.3—20 cm. long; glumes sometimes awned.
- J. Lemma of fertile flower thin, membranous. MUHLENBERGIA (p. 43)
- JJ. Lemma of fertile flower firm, hardened.
- K. Lemma-awn 3-branched. ARISTIDA (p. 41)
- KK. Lemma-awn not branched.
- L. Lemma-awn twisted, persistent. STIPA (p. 42)
- LL. Lemma-awn not twisted, deciduous. ORYZOPSIS (p. 42)
- II. Lemma awnless or with a dorsal awn 1.2 cm. or less long; glumes awnless.
- M. Lemma with a tuft of hair at base.
- N. Glumes with awns 2—5 mm. long, about equal; lemma 3-veined. MUHLENBERGIA (p. 43)
- NN. Glumes awnless.
- O. Lemma 1-veined; lower glume $\frac{1}{2}$ — $\frac{2}{3}$ as long as the upper. CALAMOVILFA (p. 49)
- OO. Lemma 5-veined; lower glume $\frac{3}{4}$ to equaling the upper. CALAMAGROSTIS (p. 45)
- MM. Lemma without hairs at base.
- P. Palet half as long as its lemma or shorter, often none; glumes exceeding the lemma; stamens 3. AGROSTIS (p. 47)
- PP. Palet over half as long as its lemma; glumes not exceeding the lemma (except in *Cinna latifolia*).
- Q. Seed tightly enclosed by the ovary; stamen 1; lemma with a very small dorsal awn. CINNA (p. 46)
- QQ. Seed loosely enclosed by the ovary; stamens 2—3; lemma awnless. SPOROBOLUS (p. 44)

ARISTIDA

3-AWNED GRASS

Annual or perennial, tufted. Leaves narrow, often involute. Spikelets narrow, on slender pedicels or nearly sessile, in a terminal panicle; rachilla jointed above the glumes. Glumes persistent, keeled, unequal, awnless or somewhat acuminate-awned. Lemma usually with a blunt hairy callus at the base, narrow, rigid, entire, awned; awn terminal, trifid, its lateral branches sometimes obsolete. Palet small, obsolete, 2-veined. Stamens 3. Grain narrow, free. (L. arista=awn.)

A. Annual; lower glume about 2.5 cm. long, 3—5-veined. E.

A. *oligantha* Michx. (Prairie 3-awn)

AA. Perennial; lower glume 0.6—1 cm. long, 1-veined.

B. Awns of lemma nearly equal, about 7 cm. long; glumes cleft at apex. E.

(*A. purpurea* of How. Fl.)

A. purpurea robusta Pip. (Purple 3-awn)

BB. Awns of lemma not nearly equal, middle one 0.8—1.7 cm. long; glumes not cleft at apex. E. (*A. fasciculata*.)

A. dispersa T. & R. (Bushy 3-awn) = *A. divaricata*

STIPA

NEEDLE-GRASS

Perennial, tufted. Leaves often rolled up. Spikelets in a terminal panicle; rachilla jointed above the glumes. Glumes persistent, narrow, keeled, unawned or rarely with a slender awn. Lemma narrow, rigid, convolute, with callus at base, awned; callus bearded, usually sharp-pointed; awn terminal, twisted, geniculate. Palet enclosed by the lemma, 2-veined. Stamens 3. Grain cylindric, included, often burying itself in the soil by the twisting and untwisting of the awn. In dry soil. (Gk. stupe=tow; referring to the tow-like plumes of some species.)

A. Awn 7.5—20 cm. long.

B. Glumes 20—30 mm. long including the point, 5-veined; lemma without crown of hairs at apex.

C. Plants glabrous. E. *S. comata* T. & R. (Needle-grass)

CC. Plants pubescent. E.

S. comata intonsa Pip.

BB. Glumes 16—20 mm. long, 3-veined; lemma with crown of hairs at apex.

E. *S. setigera* Presl. (Bear-grass)

AA. Awn 5 cm. or less long.

D. Awn only slightly pubescent or scabrous.

E. Callus acute or acuminate, about 1 mm. long.

F. Panicle 15—25 cm. long; lemma and its callus 6—7 mm. long; palet $\frac{1}{2}$ as long as the lemma.

G. Sheaths smooth; awn 3.5—6 cm. long. E.

S. nelsoni Scribn.

GG. At least the lower sheaths pubescent; awn 2—3 cm. long. E.

S. williamsii Scribn.

FF. Panicle 5—12 cm. long; lemma and its callus about 4 mm. long; palet $\frac{3}{4}$ as long as the lemma. W. C. E. (*S. minor*.)

S. columbiana Mac.

EE. Callus obtuse, very short. E.

S. lemmoni Scribn.

DD. Awn plumose.

H. Ligule 1 mm. long or less.

I. Sheaths pubescent.

J. Awn smooth or rough but not pubescent. E.

S. viridula Trin. (Feather Needle-grass)

JJ. Awn pubescent to the second bend. E.

S. elmeri F. & B.

II. Sheaths glabrous. E. (*S. oregonensis*.)

S. occidentalis Thurb. (Western Needle-grass)

HH. Ligule 2—4 mm. long. E.

S. thurberiana Pip.

ORYZOPSIS

MOUNTAIN-RICE

Perennial, tufted. Leaf-blades wide and flat or narrow and rolled up. Spikelets usually ovoid or oblong, in a narrow lax few-flowered panicle; rachilla jointed above the glumes, not prolonged beyond the palet. Glumes persistent, convex on the back,

obtuse or abruptly acute. Lemma wide, membranous, becoming hard, obtuse-truncate, terminating in an awn; awn deciduous, simple, more or less bent near the base. Palet 2-keeled. Stamens 3. Grain oblong-ellipsoid, free. (Gk. *oryza*=rice, *opsis*=form.)

A. Lemma densely covered with conspicuous long white hairs; panicles loose; not alpine species.

B. Leaf-blade smooth; lemma narrowly elliptic; awn 8—12 mm. long. E. (*Stipa bloomeri*.)
O. *bloomeri* Rick.

BB. Leaf-blade scabrous; lemma broadly oval; awn 3—5 mm. long. E. (*Eriocoma cuspidata*; O. *hymenoides*.)

O. *cuspidata* Benth. (Indian Millet)

AA. Lemma-hairs not dense nor conspicuous if present; panicle narrow (except in (O. *kingii*); alpine species (except O. *kingii*)).

C. Awn of lemma 3—4 mm. long. C. E.

O. *exigua* Thurb. (Small Mountain-rice)

CC. Awn of lemma 10—15 mm. long.

D. Alpine; rays of panicle bearing 2—4 spikelets each; lemma smooth. E.

O. *hendersoni* Vas.

DD. Not alpine; rays of panicle bearing 1—2 spikelets each; lemma with short hairs on lower half. E. (*Stipa kingii*.)

O. *kingii* Beal

MUHLENBERGIA

Perennial, rarely annual. Stems often wiry. Leaf-blade often very thin. Spikelets small, variously paniced. Rachilla articulate above the glumes, not extending beyond the palet. Glumes persistent, membranous or hyaline, keeled, acute or mucronate or short-awned; the first 1-veined, sometimes minute or obsolete; the second 1—3-veined. Lemma 3—5-veined, firm or slender, acute or obtuse, 2-toothed, mucronate or awned. Palet hyaline, 2-keeled. Stamens usually 3. Stigmas plumose. Grain narrow, subterete, free. (Honor of Henry Muhlenberg, an American botanist.)

A. Lemma acuminate but awnless; glumes $1\frac{1}{2}$ —2 times as long as the lemma. W.

C. E. (*M. glomerata*.) M. *racemosa* B. S. P. (Wild Timothy)

AA. Lemma long-awned; glumes nearly as long as the lemma or shorter.

B. Basal hairs not more than $\frac{1}{2}$ as long as the lemma; lemma 2.7 mm. long. E.

M. *sylvatica setiglumis* Wats. (Woodland Drop-seed)

BB. Basal hairs as long as the lemma; lemma 3 mm. long. E.

M. *comata* Benth. (Woolly Drop-seed)

COLEANTHUS

MOSS-GRASS

Plant 2.5—7.5 cm. high. Spikelets in umbellate clusters and these in simple or branched panicles, very small. Glumes none. Lemma hyaline, persistent, ovate, keeled, with a short terminal awn. Palet shorter and wider than the lemma, persistent, 2-keeled, divided or 2—4-toothed. Stamens 2. Stigma denticulate with subulate hairs. Grain narrowly oblong, slightly compressed, deciduous. On mud flats. (Gk. *koleos*=sheath, *anthos*=flower; flowers much enclosed in upper leaf.) W.

C. *subtilis* Seid.

POLYPOGON

BEARD-GRASS

Annual or perennial. Leaf-blades flat. Spikelets in dense spike-like or slightly interrupted and spreading panicles; pedicels jointed, with a tuft of short hairs above

the joint. Glumes subequal, with a terminal straight awn. Lemma smaller than the glumes, thinner, usually hyaline, entire or notched, with an awn in the notch or on the back; awn either twisted and bent at base or small and straight, or reduced to a minute point. Palet smaller than the lemma. Stamens 1—3. Stigmas plumose. Grain free. In wet places. (Gk. polys=much, pogon=beard.)

A. Panicles dense, cylindric; glumes notched at apex, with awns 2—3 times their length; annual. W. E. *P. monspeliensis* Desf. (Annual Beard-grass)

AA. Panicles lobed or interrupted; glumes obtuse or attenuate at apex, with awns equaling them; perennial. W.

P. littoralis Sm. (Seaside Beard-grass)

SPOROBOLUS

DROP-SEED

Annual or perennial. Leaves flat or rolled up. Spikelets in an open-pyramidal to spike-like panicle. Rachilla very short, glabrous, scarcely jointed, not prolonged beyond the flower. Glumes usually unequal, membranous, awnless, slightly keeled or convex, 0—3-veined. Lemma 0—3-veined, as long as the glumes or longer, in ours awnless but sometimes very acuminate. Palet as long as its lemma or shorter, with 2 prominent veins and often split between them. Stamens 2—3. Grain free, readily falling from the spikelet; ovary loosely enclosing the seed, often thin and evanescent. (Gk. spora=seed, ballein=to cast forth; referring to the deciduous grain.)

A. Panicle contracted, spike-like.

B. Annual.

C. Upper leaf projecting beyond the panicle. E. (*S. vaginaeflorus neglectus*.)
S. neglectus Nash (Poverty-grass)

CC. Upper leaf not reaching the top of the panicle. W. E. (*S. filiformis*; *S. gracillimus*.)
S. simplex Scribn. (Mountain Drop-seed)

BB. Perennial.

D. Lemma 1.7 mm. long. E.

S. depauperatus Scribn.

DD. Lemma 3—3.5 mm. long.

E. Stem smooth; glumes acuminate, $\frac{2}{3}$ as long as the lemma; ligule 0.5 mm. long; spikelets 4 mm. long. E. (*S. cuspidatus*.)

S. brevifolius Scribn. (Short-leaved Drop-seed)

EE. Stem minutely roughened by cross-walls; glumes acute, less than $\frac{1}{2}$ as long as the lemma; ligule 2 mm. long; spikelets 3 mm. long. E.

S. richardsonis Mer.

AA. Panicle open, branches mostly spreading.

F. Plant 6—9 dm. high; spikelets not purplish, 1.5—3 mm. long; lower glume $\frac{1}{2}$ the length of the upper or less; lemma 1-veined or veinless, 1.5—2 mm. long.

G. Sheaths naked or sparingly ciliate at the throat; panicles 2—3 dm. long; spikelets 1.5—2 mm. long; glumes veinless, glabrous. E.

S. airoides Torr. (Fine-top Drop-seed)

GG. Sheaths with a conspicuous tuft of hairs at the throat; panicles 1—2 dm. long; spikelets 2—2.5 mm. long; glumes 1-veined, scabrous on the keel. C. E.

S. cryptandrus Gray (Sand Drop-seed)

FF. Plant 0.8—4 dm. high; spikelets somewhat purplish, 1—1.5 mm. long; glumes equal or nearly so; lemma 3-veined, 1—1.5 mm. long.

H. Annual; lemma 1 mm. long or less. E.

S. confusus Vas.

HH. Perennial; lemma 1—1.5 mm. long. C. E.

S. asperifolius Thurb. (Rough Drop-seed)

GASTRIDIDIUM

Annual. Leaf-blades flat. Spikelets in a close tapering spike-like panicle. Rachilla jointed above the glumes, extending beyond the perfect flower as a short bristle. Glumes persistent, very acute, enlarged, shining, swollen at base, concave below, keeled above, awnless (ours), the first longer than the second. Lemma about $\frac{1}{4}$ as long as the second glume, with a tuft of very minute hairs at base, hairy on back, truncate-dentate at apex, usually awned (so in ours); awn slender, twisted, on the back below the apex, exceeding the spikelet. Palet as long as its lemma. Stamens 3. (Gk. gastros=belly or stomach, eidos=like; glume is swollen at base.) U. (*G. australe*.)

G. lendigerum Gaud. (Nit-grass)

CALAMAGROSTIS

REED-GRASS

Mostly perennial. Leaf-blades flat or rolled up or hair-like. Spikelets in narrow and spike-like to open and spreading panicles. Rachilla jointed above the glumes, usually extending beyond the base of the lemma as a bristle. Glumes persistent, keeled, awnless. Lemma usually shorter than the glumes, very thin, wide, usually with a tuft of hair at base, awned, 5-veined below the awn; awn dorsal, usually bent and twisted, rarely short and straight. Palet thin, more than $\frac{1}{2}$ as long as the lemma, faintly or prominently 2-veined. Stamens 3. Stigmas plumose. Grain sometimes partially adhering. (Gk. kalamos=a reed, agrostis=a grass.)

A. Awn of lemma bent; hairs at base of lemma $\frac{1}{2}$ its length or less (in *C. howellii* over $\frac{1}{2}$).

B. Awn shorter than the glumes, or projecting beyond them not more than 2 mm.

C. Spikelets 3—4 mm. long; glumes not strongly keeled; lemma 2.5—3.5 mm. long; not seashore plants.

D. Panicle pale-green. E. (*C. suksdorfii luxurians*.)

C. suksdorfii Scribn.

DD. Panicle purple. C. E.

C. rubescens Buckl.

CC. Spikelets 5—6 mm. long; glumes strongly keeled; lemma 5 mm. long; seashore plants. W. *C. aleutica* Trin. (Seashore Reed-grass)

BB. Awn exceeding the glumes by 3 mm. or more.

E. Panicle dense, almost or quite spike-like; leaves not setaceous, not nearly reaching the panicle; awn projecting not over $1\frac{1}{2}$ times the length of the lemma.

F. Leaves soft, flat. C.

C. tweedii Scribn.

FF. Leaves hard, closely rolled up.

G. Glumes scabrous all over. C. E.

C. purpurascens R. Br. (Purple Reed-grass)

GG. Glumes nearly smooth. W. C.

C. vaseyi Beal

EE. Panicle loose; leaves setaceous, nearly reaching the panicle; awn often 3 times as long as the lemma. W. C.

C. howellii Vas.

AA. Awn of lemma straight or rarely none; hairs at base of lemma more than $\frac{1}{2}$ its length (in *C. cusickii* about $\frac{1}{2}$).

H. Panicles contracted, narrow, the short branches erect after flowering.

I. Lemma with few hairs at base.

J. Leaf-blade soft, not rigid.

- K. Leaf-blade flat; ligule 4 mm. long; hairs at base of lemma about $\frac{1}{2}$ its length. E. *C. cusickii* Vas.
- KK. Leaf-blade often rolled up when dry; ligule 3 mm. long; hairs at base of lemma about $\frac{2}{3}$ its length. E.
C. neglecta Gaert. (Pony-grass)
- JJ. Leaf-blade rigid.
- L. Panicle dense, spike-like.
- M. Panicle 4—8 cm. long; glumes acute, subcoriaceous.
- N. Leaves rolled up for their whole length. E.
C. montanensis Beal
- NN. Leaves rolled up only near tip. W.
C. crassiglumis Thurb.
- MM. Panicle 5—20 cm. long; glumes acuminate, membranous. C. E.
(*C. hyperborea elongata*; *C. hyperborea americana*).
C. hyperborea Lange
- LL. Panicle narrow but too open to be spike-like.
- O. Stem without hairs below the joints; awn about equaling the lemma; spikelets brown or purplish. C. E. (*C. inexpansa cuprea*).
C. inexpansa Gray (Bog Reed-grass)
- OO. Stem pubescent with short reflexed hairs below the joints; awn very short or none; spikelets purplish. W.
C. inexpansa barbulata Kearns.
- II. Lemma with copious hairs at base. C. E.
C. scribneri Beal
- HH. Panicle loose and open even after flowering.
- P. Spikelets 2—4 mm. long (4—5 mm. in *C. canadensis acuminata*); ligule 2—4 mm. long.
- Q. Glumes 2—2.5 mm. long; ligule 2 mm. long; lemma 1.5 mm. long. E.
C. macouniana Vas.
- QQ. Glumes 3—5 mm. long; ligule 4 mm. long; lemma 2—3.5 mm. long.
- R. Leaf-blade 1.5—3 dm. long; panicle mostly tinged with purple; awn attached near middle of lemma.
- S. Glumes 3—3.5 mm. long, acute, scarcely exceeding the lemma; lemma erose-truncate. E.
C. canadensis Beauv. (Blue-joint Grass)
- SS. Glumes 4—5 mm. long, long attenuate, exceeding the lemma; lemma acute. C. E. *C. canadensis acuminata* Vas.
- RR. Leaf-blade 3—4 dm. long; panicle whitish-green; awn attached near apex of lemma. E.
C. blanda Beal
- PP. Spikelets 5—6 mm. long; ligule often 8—12 mm. long.
- T. Panicle somewhat purplish; palet less than $\frac{2}{3}$ as long as the lemma.
W. C. E. *C. langsdorfii* Trin.
- TT. Panicle whitish or pale-green; palet more than $\frac{2}{3}$ as long as the lemma.
C. *C. langsdorfii lactea* Kearns.

CINNA

INDIAN-REED

Perennial, tall. Leaf-blades flat. Spikelets in a spreading panicle. Rachilla jointed above the glumes, often prolonged beyond the base of the palet as a small projection. Glumes persistent, lanceolate, acute, awnless, with hispid keel, the first 1-veined, the second 1—3-veined. Lemma about as long as the glumes, usually raised slightly above them, 3-veined, usually short-awned on the back near the apex. Palet nearly as

long as its lemma, 2-veined or the veins united into 1. Stamens 1—3 (1 in ours). Grain linear-oblong, free. (Gk. kinna=some kind of grass.)

A. Panicle contracted, its branches erect. E.

C. arundinacea L.

AA. Panicle loose, its branches drooping. C. E. (*C. pendula*.)

C. latifolia Griseb. (Wood Indian-reed)

ALOPECURUS

FOX-TAIL GRASS

Annual or perennial. Stem erect or decumbent at base. Leaf-blades flat or rolled up; upper sheath often inflated. Spikelets flat, in a slender terminal spike-like or head-like panicle, jointed on the apex of the enlarged pedicel, falling from the axis entire. Glumes acute or obtuse, awnless or short-awned, usually united at the base, flat-keeled; keel ciliate or slightly winged. Lemma wide, obtuse, hyaline, 3—5-veined, mucronate or (in ours) with a short awn on the back, the margins united at the base. Palet present or none, narrow, hyaline, keeled, acute, partly included in the lemma. Stamens 3. Stigmas short, hairy. Grain free. (Gk. alopes=fox, oura=tail; referring to the spike.)

A. Glumes united for $\frac{1}{4}$ their length or less, long-ciliate on the keel.

B. Inflorescence 1—2.5 cm. long.

C. Annual; glumes glabrous on the outer surface except for the cilia on the keel, 3 mm. long; awn of lemma about 9 mm. long. U.

A. howellii Vas.

CC. Perennial; glumes hairy on the outer surface, 3.5—4 mm. long; awn of lemma about 6 mm. long. E.

A. occidentalis Scribn. (Mountain Fox-tail)

BB. Inflorescence 2.5—8 cm. long.

D. Annual; awn of lemma 10—15 mm. long; leaf-sheath much inflated, generally enclosing the base of the spike. E.

A. saccatus Vas.

DD. Perennial; awn of lemma 8 mm. long or less; leaf-sheath moderately to not inflated, not enclosing base of spike at maturity.

E. Stems erect; inflorescence 4—8 mm. in diameter.

F. Ligule about 1 mm. long; glumes acute; spikelets 4—6 mm. long. W.

A. pratensis L. (Meadow Fox-tail)

FF. Ligule 3—4 mm. long; glumes obtuse; spikelets 3—4 mm. long. E.
(*A. pallescens*.) *A. californicus* Vas.

EE. Stems procumbent at base; inflorescence 9—10 mm. in diameter.

G. Awn of lemma 5—8 mm. long, arising about $\frac{1}{4}$ from base; spikelets 4 mm. long; lemma shorter than the glumes. U. E.

A. geniculatus L. (Water Fox-tail)

GG. Awn of lemma 2 mm. long, arising nearly at middle of lemma; spikelets 3 mm. long; lemma longer than glume. W. C. E. (*A. geniculatus fulvus*; *A. geniculatus robustus*.)

A. geniculatus aristulatus Torr.

AA. Glumes united for $\frac{1}{3}$ — $\frac{1}{2}$ their length, smooth to hispid on the keel. W.

A. agrestis L. (Slender Fox-tail)

AGROSTIS

BENT-GRASS

Annual or perennial. Leaf-blades flat of setaceous. Spikelets 1—4 mm. long, pedicelled, grouped in a loosely spreading to spike-like panicle; rachilla jointed above the glumes, glabrous or nearly so, rarely prolonged beyond the flower. Glumes persistent,

narrow, keeled, acute, awnless. Lemma shorter than the glumes, wide, delicately hyaline, awned or awnless; awn slender, twisted, attached below or sometimes above the middle of the lemma. Palet very thin, not over $\frac{1}{2}$ as long as the lemma, often very minute or none. Stamens 1—3. Stigmas plumose. Grain free. (Gk. agros=a field; from the habitat.)

A. Rachilla prolonged behind the palet.

B. Spikelets 3 mm. long, usually purple; rachilla extending 0.6—1.5 mm. beyond the palet; ligule 2 mm. long. C. E.

A. aequivalvis Trin.

BB. Spikelets 2 mm. long, usually pale; rachilla extending 0.3—0.5 mm. beyond the palet; ligule 6 mm. long. C. E.

A. thurberiana Hitch.

AA. Rachilla not prolonged behind the palet.

C. Palet evident, 2-veined.

D. Palet $\frac{1}{2}$ as long as the lemma or longer; panicle close, spike-like.

E. Glumes scabrous on keel and back; lemma $\frac{1}{2}$ as long as the glumes; panicle contracted, either lobed or verticillate. E. (*A. verticillata*.)

A. stolonifera L. (Creeping Bent-grass)

EE. Glumes scabrous on keel but smooth on back; lemma at least $\frac{2}{3}$ as long as the glumes; panicle more open.

F. Plants with extensive creeping short-leaved stolons; panicle 2.5—5 cm. long. E.

A. depressa Vas.

FF. Plants without stolons; panicle mostly larger.

G. Spikelets 2—3 mm. long; panicle 5—30 cm. long; plants 2—15 dm. high, with rootstocks, not alpine. W. E.

A. alba L. (Red-top)

GG. Spikelets 1.5—2 mm. long; panicle 2—8 cm. long; plants 1—4 dm. high, without rootstocks, alpine. W. C. E.

A. humilis Vas.

DD. Palet $\frac{1}{4}$ as long as the lemma; panicle either close and spike-like or open.

W. *A. densiflora* Vas. (Dense-flowered Bent-grass)

CC. Palet none, or a small veinless scale.

H. Plants spreading by rootstocks.

I. Hairs at base of lemma 1—2 mm. long. U. E. (*A. pringlei*; *A. hallii* *pringlei*.)

A. hallii Vas.

II. Hairs at base of lemma minute, or none. W. C. E. (*A. pallens foliosa*; *A. diegoensis*.)

A. pallens Trin.

HH. Plants tufted, without rootstocks.

J. Panicle narrow, rather close.

K. Lemma-awn exerted.

L. Glumes awn-pointed; panicle narrow and rather compact. W. E.

A. microphylla Steud.

LL. Glumes merely acute; panicle more open and verticillate. C. E. (*A. virescens* of How. Fl.)

A. ampla Hitch.

KK. Lemma awn included or none.

M. Spikelets 4—5 mm. long. W.

A. occidentalis L.S. & M.

MM. Spikelets 2—2.5 mm. long.

N. Panicle 3—6 cm. long; plant low, alpine. W. C. E. (*A. varians*.)

A. rossae Vas.

- NN. Panicle 5—30 cm. long; plant taller, not alpine. W. C. E.
(*A. asperifolia*; *A. grandis*; *A. scouleri*.)
A. exarata Trin. (Northern Red-top)
- JJ. Panicle open, loose.
O. Lemma with an awn from near its base. C.
A. howellii Scribn.
- OO. Lemma with an awn at or above the middle, or awnless.
P. Inflorescence very diffuse; herbage scabrous.
Q. Lemma awnless. W. C. E. (*A. scabra*.)
A. hyemalis B. S. P. (Rough Bent-grass)
- QQ. Lemma-awn scarcely exerted. C. (*A. geminata*.)
A. hyemalis geminata Hitch. (Mountain Bent-grass)
- PP. Inflorescence not diffuse.
R. Lemma awnless; palet small or none.
S. Plants 1—3 dm. high; spikelets 1.5 mm. long; lemma 1 mm. long; panicle pale. E. (*A. tenuiculmis*.)
A. idahoensis Nash
- SS. Plants 3—10 dm. high; spikelets 2.2—3 mm. long; lemma 2 mm. or more long; panicle pale or dark.
T. Panicle pyramidal, dark purple; palet none. C. E. (*A. attenuata*.)
A. oregonensis Vas.
- TT. Panicle elongated, oblong, not dark purple; palet 0.2—0.6 mm. long. E.
A. schiedeana Trin.
- RR. Lemma awned; palet none. C.
A. canina L. (Brown Bent-grass)

CALAMOVILFA

SAND-GRASS

Perennial, rather tall, rigid, with horizontal rootstocks. Spikelets in more or less diffuse panicles; rachilla jointed above the glumes, not prolonged beyond the palet. Glumes acute, awnless, persistent, unequal, chartaceous, thick, compressed-keeled. Lemma chartaceous, 1-veined, awnless, acute, with a tuft of hairs at base. Palet chartaceous, 2-keeled, 2-toothed, as long as the lemma, wide. (Gk. *kalamos*=a reed; *vilfa*=another genus of grasses; hence a reed-like *Vilfa*.) E.

C. longifolia Hack.

PHLEUM

TIMOTHY

Annual or perennial (ours), erect. Leaf-blades flat. Spikelets flat, in a dense cylindric or ovoid spike-like panicle; rachilla very short, jointed above the glumes, sometimes extending beyond the lemma as a short spine. Glumes persistent, almost equal, membranous, compressed-keeled, 1—3-veined, abruptly pointed, the keel projecting as a point or awn. Lemma shorter and wider than the glumes, thin, hyaline, truncate or denticulate, awnless, 5-veined, enclosing the palet. Palet nearly equaling the lemma, narrow, hyaline. Stamens 3. Grain ovoid, free. (Gk. *phleos*=some kind of reed.)

A. Spike-like panicles 1.5—3 cm. long; awn of glume 2 mm. long; plant 2—6 dm. high. W. C. E. *P. alpinum* L. (Mountain Timothy)

AA. Spike-like panicles 3—17 cm. long; awn of glume 1 mm. long; plant 4—10 dm. high. W. E. *F. pratense* L. (Timothy)

AVENEAE (OATS TRIBE)—Spikelets usually 2 to several flowered (so in ours), in either open or spike-like panicles. Rachilla usually produced beyond the upper lemma (except in *Aira* in ours), usually with tufts of hairs at the joints. Flowers perfect, or 1 of them staminate or abortive. Glumes 2, often persistent, usually longer than the first lemma. Lemma with tuft of hair at base; 1 or more lemmas in each spikelet awned (except in *Trisetum muticum* in ours); awn either dorsal or near the apex between the lobes, often more or less twisted and bent. Palea 2-keeled. Stigmas plumose. Grain furrowed or unfurrowed, free or adherent.

A. Plants 2 dm. high or less; spikelets 2-flowered, both perfect; rachilla jointed below the glumes, not prolonged beyond the upper flower. AIRA (p. 50)

AA. Plants mostly taller; spikelets 2 to several flowered, sometimes only 1 perfect when only 2; rachilla jointed above the glumes (except in *Holcus*), prolonged beyond the upper flower.

B. Plants densely soft-whitish-hairy; spikelets falling off entire; rachilla jointed below the glumes; spikelets 2-flowered, the lower perfect, the upper staminate; awn of second flower hook-like. HOLCUS (p. 50)

BB. Plants not densely soft-whitish-hairy; spikelets falling off in parts; rachilla jointed above the glumes; spikelets 2 to several flowered (2 only in *Arrhenatherum*, which has the perfect flower above); awns not hook-like.

C. Spikelets 1 cm. long or less.

D. Spikelets 8—10 mm. long; lemma awned from near the base; spikelets only 2-flowered; upper flower perfect or pistillate, the lower staminate. ARRHENATHERUM (p. 51)

DD. Spikelets either less than 7 mm. long or else lemma awned from the middle or above it; spikelets 2 to many flowered; upper flower sometimes staminate or abortive, the others perfect.

E. Lemma keeled, obtuse or truncate, erose at tip, awn arising at or below the middle. DESCHAMPSIA (p. 51)

EE. Lemma convex, acute or shortly bifid, not erose, awn none or arising above the middle. TRisetum (p. 51)

CC. Spikelets over 1 cm. long.

F. Perennial; awn of lemma between the teeth at apex; grain glabrous. DANTHONIA (p. 52)

FF. Annual or perennial; awn of lemma dorsal; grain hairy. AVENA (p. 53)

HOLCUS

Annual or perennial (ours), soft. Leaf-blades flat, or rarely folded. Spikelets 2-flowered, deciduous as a whole, numerous and crowded in an open terminal panicle; lower flower perfect, on a curved stipe; upper one staminate or rarely perfect; rachilla jointed above the glumes. Glumes subequal, compressed, boat-shaped, acute or awned, projecting beyond the flowers, 3-veined, the second the wider. Lemma shorter than the glumes, boat-shaped, membranous, the lower awnless, the upper with a short bent dorsal awn. Stamens 3. Grain oblong, free. (Gk. *holkos*=some kind of grass.)

W. E.

H. lanatus L. (Velvet Grass)

AIRA

HAIR-GRASS

Slender, delicate, annual. Leaf-blades narrow. Spikelets 2-flowered, small, in a terminal panicle; panicle loose or rarely contracted (in *A. praecox*), with capillary rays; rachilla jointed, minutely hairy, not at all or scarcely extending beyond the perfect flowers. Glumes thinly scarious, subequal, acute, exceeding the flowers. Lemmas close

above the glumes, shorter, thin, hyaline, finely pointed or shortly bifid, awned or the lower sometimes awnless; awn fine, dorsal, twisted, arising below the middle. Palet hyaline, nearly as long as its lemma. Stamens 3. Grain more or less adherent. (Gk. *aira*=a deadly weapon; applied to a poisonous darnel.)

A. Panicle loose and spreading; leaf-sheaths mostly much shorter than the internodes.

W. *A. caryophyllea* L. (Silvery Hair-grass)

AA. Panicle dense, spike-like or nearly so; leaf-sheaths almost as long as the internodes. W.

A. praecox L. (Early Hair-grass)

ARRHENATHERUM

Perennial, tall. Leaf-blades flat. Spikelets 2-flowered, in a loose terminal erect often 1-sided panicle; the lower flower staminate, the upper perfect or pistillate; rachilla hairy, jointed below the lower flower, produced into a straight point or bristle above the upper one. Glumes unequal, persistent, acute, thin, scarious on the margins, keeled. Lemma thinly scarious, 5—7-veined, apex slightly dentate; the lower with a dorsal twisted geniculate awn attached near the base; the upper unawned, or with a minute awn near the apex, or with a dorsal twisted awn. Palet hyaline, ciliate on the veins. Stamens 3. Grain ovoid, not furrowed, free. (Gk. *arren*=masculine, *ather*=awn; only the staminate flower is awned.) W.

A. elatius Beauv. (Tall Oat-grass)

DESCHAMPSIA

HAIR-GRASS

Annual or perennial, tufted. Spikelets 2—3-flowered, shining, in a terminal panicle; panicle loose, or rarely contracted; rachilla hairy, more or less prolonged beyond the upper palet. Glumes keeled, rarely acute, the sides thinly scarious. Lower flowers sessile; upper one stalked. Lemma membranous or nearly hyaline, 4-veined, obtuse or truncate, 2—4-toothed, awned; awn fine, dorsal, arising at or below the middle. Palet narrow, often 2-toothed. Stamens 3. Grain usually free. (Honor of J. C. A. Loiseleur-Deslongchamps, a French botanist.)

A. Some of the flowers projecting beyond the glumes; awn very slightly or not at all projecting beyond its lemma. W. E.

D. caespitosa Beauv. (Tufted Hair-grass)

AA. Flowers not projecting beyond the glumes; awn projecting beyond its lemma once the lemma-length or more.

B. Perennial; glumes 3—6 mm. long; awn either less than 6 mm. long or straight, or both.

C. Leaf-blades flat; awn hardly or not at all projecting beyond the glumes; glumes 1-veined, 4.5—6 mm. long; plants 1.5—4 dm. high. W. C. E.

D. atropurpurea Scheel (Mountain Hair-grass)

CC. Leaf-blades rolled up; awn projecting beyond the glume at least $\frac{1}{2}$ the glume-length; glumes 3-veined, 3—4 mm. long; plants 3—12 dm. high. W.

C. E. *D. elongata* Mun. (Slender Hair-grass)

BB. Annual; glumes 6—8 mm. long; awn 6—12 mm. long, geniculate. E.

D. danthonioides = *D. calycina* Presl. (Oat-like Hair-grass)

TRisetum

FALSE OAT

Perennial, tufted. Spikelets 2—5-flowered, in a panicle; panicle narrow or spreading, loose or dense; rachilla jointed, hairy or smooth, more or less elongate between the flowers, extending beyond the upper fertile flower either as a hairy bristle or bearing

a terminal sterile or male flower. Glumes keeled, thinly scarious on the sides, unequal; the first the shorter, 1—5-veined; the second nearly as long as the spikelet, 3-veined. Lemma more hyaline than the glumes, keeled, acute or shortly bifid, awned; awn attached above the middle, dorsal or at the base of the cleft (sometimes none in *T. muticum*), usually twisted at base and more or less bent. Palet hyaline, narrow, usually 2-toothed. Stamens 3. Grain smooth, oblong, unfurrowed, glabrous or pubescent at the apex, enclosed, free. (L. tres=3, seta=a bristle; lemma has 1 awn and 2 sharp teeth.)

A. Glumes almost equal; lemma acute, awnless or with awn about 1 mm. long or less.

B. Glumes 6—7 mm. long; spikelets 3-flowered. E.

T. muticum Scribn. (Beardless False-oat)

BB. Glumes 3—5 mm. long; spikelets 2-flowered. E. (*Grapheophorum wolffii*.)

T. wolffii Vas. (Wolf's False-oat)

AA. Glumes unequal, the first $2/3$ — $3/4$ as long as the second; lemma cleft at apex, awn 4—12 mm. long.

C. Panicle dense, 5—12 cm. long; plant 1.5—6 dm. high; spikelets 5—6 mm. long. W. C. E. (*T. subspicatum*; *T. spicatum molle*; *T. subspicatum molle*.)

T. spicatum Richt. (Narrow False-oat)

CC. Panicle not dense, 12—20 cm. long; plants 3—12 dm. high; spikelets 6—8 mm. long.

D. Leaf-sheath glabrous; lemma 5—6 mm. long, awn arising below the cleft.

W. C. E.

T. cernuum Trin. (Nodding False-oat)

DD. Leaf-sheath pubescent; lemma 6—7 mm. long, awn arising at the cleft.

W. C. E.

T. canescens Trin. (Silvery False-oat)

DANTHONIA (Merathrepta)

OAT-GRASS

Perennial, or rarely annual. Spikelets several-flowered, pedicelled or almost sessile, solitary or in a raceme or panicle; rachilla jointed above the glumes, hairy, extending above the flowers. Glumes narrow, keeled, acute, awnless, persistent, 3—7-veined, rarely 1-veined, usually as long as the spikelet. Lemma rounded on the back, 7—9-veined, awned, with 2 terminal lobes; lobes firm, scarious, more or less 1—3-veined at base; awn twisted, bent, arising between the lobes. Palet wide, as long as the entire part of the lemma or longer, obtuse or 2-pointed. Stamens 3. Grain glabrous, free. (Honor of Etienne Danthoine, a French botanist.)

A. Spikelets in a narrow close panicle, ascending.

B. Callus elongate, densely hairy.

C. Leaves of sterile shoots 15—25 cm. long, sparsely hairy. C. E.

D. intermedia Vas.

CC. Leaves of sterile shoots longer, without hairs. W. E.

D. intermedia cusickii Wms.

BB. Callus very short, with a few short hairs. W. E.

D. pinetorum (Pip.)

AA. Spikelets solitary or spreading in a loose panicle.

D. Spikelets 3—10; leaf-sheath only slightly hairy; apex of lemma with 2 teeth 2—3 mm. long. E. *D. californica* Bol. (California Oat-grass)

DD. Spikelets 1—4; leaf-sheath quite hairy; apex of lemma with 2 awl-like teeth 3—10 mm. long.

E. Spikelets usually 2—4; lemma abruptly narrowed, 6—8 mm. long. W. C.

D. americana Scribn.

EE. Spikelets usually only 1; lemma not abruptly narrowed, 8—10 mm. long.

E.

D. unispicata Thurb. (Mountain. Oat-grass)

AVENA

OATS

Annual or perennial. Spikelets few-flowered, rarely 1-flowered, in a loose panicle; rachilla jointed above the glumes, hairy under the lemma. Glumes scarious at least at the apex, lanceolate, nearly equal. Lemma smaller than the glumes, rounded on the back, 5—11-veined, 2-cleft at the apex, awned; awn dorsal, twisted; terminal lemma often small, empty. Palet narrow, 2-toothed. Stamens 3. Grain pubescent or hairy, rarely smooth, deeply grooved, frequently adherent. (The Latin name.)

A. Lemma-awn 2—4 cm. long, abruptly bent near the middle, arising near middle of lemma.

B. Lemma pubescent with long rigid brown hairs, also with ring of stiff hairs at base. W. E. *A. fatua* L. (Wild Oats)

BB. Lemma smooth except for ring of stiff hairs at base and for scabrous apex. W. E. (*A. fatua glabrescens*.)

A. fatua glabrata Pet. (Smooth Wild Oats)

AA. Lemma-awn 2 cm. or less long, not or hardly abruptly bent, arising $\frac{3}{4}$ way up lemma.

C. Annual; spikelets 20—25 mm. long, 2—3-flowered; glumes 9—11-veined. W. E. *A. sativa* L. (Cultivated Oats)

CC. Perennial; spikelets 10—15 mm. long, 3—6-flowered; glumes 3—5-veined. E. *A. striata* Michx. (Perennial Oats)

FESTUCEAE (BLUE-GRASS TRIBE)—Inflorescence a panicle, spike-like or spreading. Spikelets 2- to many-flowered, very rarely 1-flowered; rachilla usually produced above the upper floret or bearing 1 or more terminal lemmas. Glumes keeled, acuminate to obtuse, shorter than the first lemma. Lemma usually wider than the glumes, entire to 3-cleft, awnless, or with 1—many awns (not ours); awns terminal, rarely dorsal. Palet 2-keeled, usually as long as its lemma or nearly so. Stigmas plumose. Grain free from or adhering to the palet.

A. Lemma with 1—3 veins.

B. Rachilla with long hairs which exceed the lemma in length; plants tall, reed-like. PHRAGMITES (p. 54)

BB. Rachilla glabrous or with short hairs which do not equal the lemma in length; plants not reed-like.

C. Plant 1—2 dm. high; stems dichotomously branched; leaves crowded in dense tufts at the nodes or ends of the stems; stigma with short hairs on all sides. MUNROA (p. 54)

CC. Most species taller; stems not dichotomously branched; leaves not in dense tufts along the stem; stigma plumose.

D. Glumes nearly equal in length, but very unlike in form, the first narrowly linear and 1-veined, the second broadly obovate and obtuse and 3-veined.

EATONIA (p. 55)

DD. Glumes unequal in length, but similar in form.

E. Lemmas acute or awned, the veins converging in the tip.

KOELERIA (p. 55)

EE. Lemmas obtuse, the veins parallel and not converging in the tip.

F. Panicle narrow; spikelets 3—50-flowered; rachilla not jointed; lemma deciduous; palet persistent. ERAGROSTIS (p. 55)

FF. Panicle open; spikelets 2-flowered; rachilla jointed; lemma and palet both deciduous. CATABROSA (p. 55)

AA. Lemma with 5 or more veins.

- G. Spikelets nearly sessile, in dense 1-sided clusters at the ends of the few panicle-branches. DACTYLIS (p. 57)
- GG. Spikelets not in dense 1-sided clusters at the ends of the panicle-branches.
- H. Spikelets as wide as long, somewhat heart-shaped. BRIZA (p. 57)
- HH. Spikelets much longer than wide, not heart-shaped.
- I. Keels of the palet with a distinct crest or wing-like appendage. PLEUROPOGON (p. 57)
- II. Keels of the palet not winged.
- J. Lemma somewhat keeled on the back.
- K. Lemma 2-toothed at apex, very rarely awnless; stigma arising below apex of ovary. BROMUS (p. 65)
- KK. Lemma acute or obtuse, not 2-toothed, not awned; stigma arising at apex of ovary.
- L. Glumes with 1—3 veins. POA (p. 57)
- LL. Glumes with 5 or more veins. DISTICHLIS (p. 57)
- JJ. Lemma rounded on the back, not at all keeled.
- M. Upper lemmas of spikelet sterile and folded about each other. MELICA (p. 56)
- MM. Upper lemmas of spikelet either perfect, or else narrow and abortive but not folded about each other.
- N. Lemma 2-toothed at apex, mostly awned from just below the apex; stigmas arising below apex of ovary. BROMUS (p. 65)
- NN. Lemma not 2-toothed at apex; lemma-awn none or at the very apex; stigmas arising at apex of ovary.
- O. Lemma acute, often awned, not scarious at apex; lemma-veins not prominent. FESTUCA (p. 62)
- OO. Lemma obtuse, awnless, scarious at tip.
- P. Lemma prominently 5—9-veined; style present; lodicules united. GLYCERIA (p. 61)
- PP. Lemma obscurely 5-veined; style none; lodicules separate. PUCCINELLIA (p. 62)

MUNROA

Annual, low, diffusely many-stemmed. Leaf-blades short, usually sharp-pointed, clustered at the ends of the branches. Spikelets 2—4-flowered, perfect, nearly sessile, 3—5 together in a bunch in the axil of the floral leaves; rachilla jointed above the empty glumes. Glumes lanceolate, acute, hyaline, 1-veined. Lemma 3-veined, entire or retuse or 3-cleft, the mid-vein or all the veins excurrent as short mucronate points. Palet hyaline, enclosed within the lemma. Stamens 3. Grain enclosed, not adherent. On dry soil. (Honor of Gen. Wm. Munro, an English agrostologist.) E.

M. squarrosa Torr. (False Buffalo-grass)

PHRAGMITES

Perennial, tall, reed-like. Leaf-blades firm, wide, flat. Spikelets loosely 3—7-flowered, in a large much-branched panicle; rachilla jointed above the glumes and between the flowers, covered with long silky hairs; lowest flowers staminate or empty, the others perfect. Glumes thin, lanceolate, unequal, acute. Lemma glabrous, very narrow, long, acuminate. Palet much shorter than the lemma, hyaline, 2-ribbed. Stamens 3. Grain enclosed, not adherent. Along fresh-water shores. (Gk. *phragmites*=growing in hedges; referring to its hedge-like growth along ditches.) E. (*P. phragmites*.)

P. communis Trin. (Reed)

ERAGROSTIS

MEADOW-GRASS

Annual (ours) or perennial. Leaves flat, usually numerous, pilose at the ligule. Spikelets 3—50-flowered, compressed, awnless, perfect except the upper flower; panicle usually large, spreading or contracted; rachilla usually persistent with the palets. Glumes ovate, acute or somewhat obtuse, smooth or slightly hairy on the keel. Lemma membranous, keeled, 3-veined. Palet arched, slightly shorter than the lemma. Grain enclosed, free, oblong or globose. (Gk. *er*=spring, *agrostis*=a grass.)

A. Plant prostrate, creeping; spikelets 10—40-flowered; glumes 0.5—1 mm. long.
W. E. (*E. repens*.) *E. hypnoides* B. S. P. (Creeping Meadow-grass)

AA. Plants not prostrate, often caespitose.

B. Spikelets 4—50-flowered; glumes 1.5—1.8 mm. long.

C. Spikelets 2—3 mm. wide, 6—50-flowered. E.
E. major Host (Stink-grass)

CC. Spikelets 1—2 mm. wide, 4—20-flowered. E.
E. pilosa Beauv. (Slender Meadow-grass)

BB. Spikelets 3—12-flowered; glumes 0.5—0.7 mm. long. E.
E. lutescens Scribn.

EATONIA

Perennial, slender. Leaf-blades usually flat. Spikelets 2—3-flowered; panicle narrow; rachilla jointed below the glumes and between the flowers; lower flowers and the glumes falling together. Glumes subequal, exceeding the upper but not the lower flowers, subcoriaceous in fruit; the first narrow, 1-veined; the second wider, usually obovate, 3-veined. Lemma chartaceous, obscurely 3-veined, awnless (ours) or awned below the summit; awn usually straight or divergent. Palet hyaline, narrowed toward the base. Stamens 3. Grain enclosed, not adherent. (Honor of Amos Eaton, an American botanist.)

A. Upper glume subcucullate-obtuse, obovate, much wider than the lemma; spikelets 2.5—3 mm. long. E. *E. obtusata* Gray (Early Bunch-grass)

AA. Upper glume acute, oblanceolate, as wide or slightly wider than the lemma; spikelets 3—3.5 mm. long. E. *E. pennsylvanica* Gray

KOELERIA

Annual or perennial (ours), tufted. Leaf-blades flat or almost setaceous. Spikelets 2—7-flowered, rarely 1-flowered, flat, with short pedicel, numerous; panicle dense, spike-like, cylindric or interrupted; rachilla glabrous, jointed between the flowers, naked beyond the upper flower. Glumes acute to acuminate or shortly awn-pointed, unequal, scarious-margined. Lemma similar to the glumes, more scarious, 3—5-veined, obtuse to mucronate-pointed. Stamens 3. Grain enclosed, not adherent. (Honor of G. L. Koeler, a German botanist.) W. E. *K. cristata* Pers. (June-grass)

CATABROSA

Perennial. Leaves flat, soft. Spikelets usually 2-flowered; panicle open; rachilla smooth. Glumes membranous, unequal, very obtuse, purplish (ours). Lemma membranous, obtuse or barely 3-toothed, exceeding the glumes. Stamens 3. Grain oblong-obovoid. Aquatic. (Gk. *katabrosis*=an eating; glumes and lemmas have margins rough as if gnawed.) E. *C. aquatica* Beauv. (Water Whorl-grass)

MELICA

MELIC-GRASS

Perennial, tall. Leaves flat. Spikelets 1- to several-flowered; panicles contracted or open; rachilla usually bearing 2—3 club-shaped hooded scales beyond the flowers. Glumes 3—5-veined, membranous. Lemma rounded on back, 7—13-veined, awned or awnless, somewhat scarious at margin. Palet wide. Stamens 3. Grain enclosed, free. (L. mel=honey; at first the name of *Sorghum* which has a sweet pith.)

A. Lemma notched at apex, usually awned.

B. Panicle spreading; stem swollen and bulb-like at base.

C. Awn none or less than 2 mm. long.

D. Awn present. U. C.

M. bromoides Gray

DD. Awn wholly wanting. U.

M. bromoides howellii Scribn.

CC. Awn 4—6 mm. long. W. C. E.

M. smithii Vas.

BB. Panicle contracted; stem not swollen and bulb-like at base.

E. Awn 0—3 mm. long; ligule 1 mm. long.

F. Plant 4—10 dm. high; spike-like panicle 10—20 cm. long; spikelets 4—8-flowered. W. C. E.

M. harfordii Bol.

FF. Plant 2—3 dm. high; spike-like panicle 3—8 cm. long; spikelets about 3-flowered. U. E. (*M. harfordii minor*.)

M. harfordii tenuior Pip.

EE. Awn 6—10 mm. long; ligule 4 mm. long. E.

M. aristata Thurb. (Bearded Melic-grass)

AA. Lemma not notched at apex, awnless.

G. Apex of lemma long-acuminate. W. C. E. (*M. acuminata*.)

M. subulata Scribn.

GG. Apex of lemma merely acute or obtuse.

H. Spikelets 10—16 mm. long; stems not bulb-like at base.

I. Spikelets 12—16 mm. long; palet obtuse. E.

M. stricta Bol.

II. Spikelets about 10 mm. long; palet 2-toothed. U. C. E.

M. interrupta Trin.

HH. Spikelets 5—10 mm. long; stems swollen and bulb-like at base.

J. Spikelets shining; plants not tufted.

K. Lemma acuminate or 2-toothed, often apiculate between the teeth. C. E. (*M. scabrata*.)

M. spectabilis Scribn. (Large-flowered Melic-grass)

KK. Lemma obtuse, not apiculate. E.

M. bulbosa Gey. (Thick-rooted Bunch-grass)

JJ. Spikelets dull; plants mostly tufted.

L. Panicle usually spreading; glumes coriaceous. C. E. (*M. fugax mado-phylla*.)

M. fugax Bol. (Small Melic-grass)

LL. Panicle linear, strict; glumes membranous.

M. Leaves and stems smooth or nearly so. C. E.

M. bella Pip.

MM. Leaves and stems with a dense short reflexed pubescence. E.

M. bella intonsa Pip.

PLEUROPOGON

Annual or perennial (ours), erect, soft. Leaf-blades flat. Spikelets 8—15-flowered, perfect, rather large, in terminal racemes, distant, short-pedicelled; rachilla jointed above the glumes and between the flowers. Glumes membranous or somewhat hyaline, 1-veined, or the upper imperfectly 3-veined, awnless, unequal. Lemma membranous or cartilaginous, 5—7-veined; apex hyaline or emarginate or 2-toothed, with the mid-vein extending into a short mucro or awn. Palet hyaline, 2-veined; its keels winged, ciliate. Stamens 3. Grain oblong, hard, enclosed, free. (Gk. pleuron=side, pogon=beard; referring to the ciliate palet-keels.)

A. Plant 3—6 dm. high; leaf-blades about 4 mm. wide, raceme 1.5—2 dm. long; spikelets 1.5—2.5 cm. long; lemma 5—6 mm. long; awn of lemma 8—16 mm. long; palet 5 mm. long. U. *P. californicum* Benth. (California Pleuropogon)

AA. Plant 6—12 dm. high; leaf-blades 6—8 mm. wide; raceme 2—3 dm. long; spikelets 2.5—5 cm. long; lemma 7—8 mm. long; awn of lemma about 6 mm. long; palet 7 mm. long. W. C. *P. refractum* Benth. (Nodding Pleuropogon)

DISTICHLIS

Perennial, rigid, erect, with extensive creeping rootstocks. Leaf-blades involute. Spikelets 8—16-flowered, dioicous, compressed, shortly pedicelled; panicle narrow; rachilla jointed between the flowers, glabrous; flowers imbricate. Glumes firm, acute, unequal, 3—11-veined, unawned. Lemma very wide, obtuse to acute or shortly awned, rigid, coriaceous, 3- to many-veined. Stamens 3. Styles thickened at base. Grain flattish, broadly ovoid, enclosed, not or only slightly adherent. Salt marshes and alkali flats. (Gk. distichos=2-ranked; the inflorescence is somewhat flat.) W. E. (*D. dentata*; *D. maritima*.) *D. spicata* Gr. (Salt-grass)

BRIZA

QUAKING-GRASS

Annual (ours) or perennial. Leaves flat or convolute. Spikelets somewhat flat, several flowered, nodding, 3—9-flowered (ours), 2—3 mm. long (ours), about 2 mm. wide (ours); panicle open (ours) or contracted; flowers perfect. Glumes thin, membranous, strongly concave, 3—5-veined. Lemmas imbricated, wider than the glumes, 5- to many-veined, the upper often sterile. Palet much shorter than the lemma, hyaline. Stamens 3. Grain enclosed, usually free. (Gk. briza=a grain like rye.) U.

B. minor L.

DACTYLIS

ORCHARD-GRASS

Perennial. Leaf-blades flat. Spikelets 3—5-flowered, nearly sessile, much flattened, in dense somewhat 1-sided fascicles which are arranged in a 1-sided panicle; rachilla jointed above the glumes and between the flowers. Glumes unequal, 1—3-veined, acute or mucronate, sharply keeled, hispid-ciliate on the keel. Lemma 5-veined, strongly ciliate-keeled, shortly awn-pointed. Stamens 3. Grain narrow, oblong, enclosed, not adherent. (Gk. dactylus=a finger; referring to the thick spreading panicle-branches.) W. E.

D. glomerata L.

POA

BLUE-GRASS

Annual or perennial. Leaf-blades narrow, usually flat, ending in a cucullate point. Spikelets 2—6-flowered, rarely 7—10-flowered, the upper flower imperfect or

rudimentary; panicle usually loose and spreading, rarely narrow and spike-like; rachilla jointed between the flowers, glabrous or rarely sparingly pilose. Glumes membranous, acute or obtuse, persistent, 1—3-veined. Lemma membranous or herbaceous, delicately scarious-margined, mostly scarious-tipped, acute or obtuse, keeled, awnless, usually surrounded by a few woolly hairs, 5 (rarely 7-)veined; veins usually bent inward near the apex, dorsal or marginal ones usually soft-hairy. Palet 2-toothed. Stamens 2—3. Grain ovoid or oblong or almost linear, compressed, rarely with a wide groove, glabrous, enclosed. (Gk. *poa*=grass or fodder in general.)

A. Lemma with long spider-web-like hairs at base. GROUP 1 (p. 58)

AA. Lemma without spider-web-like hairs at base.

B. Lower glume 1-veined. GROUP 2 (p. 59)

BB. Lower glume 3—5-veined. GROUP 3 (p. 60)

GROUP 1

A. Stem flat, 2-edged; panicle 1—4 cm. long, flat. W. E.

P. compressa L. (Canada Blue-grass)

AA. Stem terete; panicle often smaller, rarely flat.

B. Lemma smooth or merely roughish.

C. Panicle 2.5—7.5 cm. long; palet 2-toothed. E.

P. kelloggii Vas.

CC. Panicle 10—15 cm. long; palet obtuse.

D. Leaf-sheath exceeded by the internode; panicle-branches smooth. W. E.
(*P. bolanderi chandleri*.)

P. bolanderi Vas.

DD. Leaf-sheath exceeding the internode; panicle-branches scabrous. E.

P. subtrivialis Rydb.

BB. Lemma pubescent on the back at least on the veins or on its lower half.

E. Lower glume 1-veined.

F. Lower 2—3 nodes of the panicle usually with more than 3 rays.

G. Leaf-sheath rough.

H. Spikelets 3—4.5 mm. long; lemma 2.5—3 mm. long. W.

P. trivialis L. (Rough Meadow-grass)

HH. Spikelets 6.5—7.5 mm. long; lemma 4—5 mm. long. W.

P. occidentalis V. & S. (Western Blue-grass)

GG. Leaf-sheath smooth.

I. Upper ligule 1.5 mm. long; rootstocks present, hence stems not tufted.

W. C. E. *P. pratensis* L. (Kentucky Blue-grass)

II. Upper ligule 4 mm. long; rootstocks none, hence stems tufted. W.

P. howellii V. & S.

FF. Lower 2—3 nodes of the panicle usually 2—3-rayed.

J. Leaves not soft and flaccid, more or less folded lengthwise. C.

P. arctica R. Br.

JJ. Leaves soft and flaccid, flat.

K. Spikelets 3—4 mm. long; plant 5—7 dm. high. W. C. E.

P. leptocoma Trin. (Mountain Blue-grass)

KK. Spikelets 5—6 mm. long; plant 1—3.5 dm. high. E.

P. reflexa V. & S. (Nodding Blue-grass)

EE. Lower glume 3—5-veined.

L. Seashore plant, dioicous; spikelets 10—15 mm. long. W.

P. macrantha Vas.

LL. Not particularly a seashore plant; spikelets perfect, 3—5 mm. long.

- M. Panicle 15—35 cm. long. W. E. (*P. flava* for our region.)
 P. triflora Gileb. (Fowl Meadow-grass)
 MM. Panicle 5—12.5 cm. long.
 N. Ligule of upper leaf 0.5 mm. long; panicle-rays 4—7 in a whorl. E.
 (*P. nemoralis* of How. Fl.; *P. glauca*.)
 P. interior Rydb.
 NN. Ligule of upper leaf 2—2.5 mm. long; panicle rays 1—5 in a
 whorl. E. *P. laxa* Haenke

GROUP 2

- A. Lemma-veins with long soft hairs along their lower portion.
 B. Annual. W. E. *P. annua* L. (Annual Spear-grass)
 BB. Perennial.
 C. Seashore plant. W. F. *pachypholis* Pip.
 CC. Not a seashore plant.
 D. Ligule of upper leaf 2—3 mm. long; lemma 3-veined, spikelets 5—6 mm.
 long; panicle 2.5—7.5 cm. long. C.
 P. alpina L. (Mountain Spear-grass)
 DD. Ligule of upper leaf 4—10 mm. long; lemma 5-veined; spikelets 6—12
 mm. long; panicle 7.5—12.5 cm. long. E.
 P. longiligula Scribn.
 AA. Lemma-veins without long soft hairs, tho often pubescent or hispid.
 E. Lateral veins of the lemma arched, converging above.
 F. Leaves filiform and rolled up.
 G. Panicle dense.
 H. Lemma smooth; leaf-blade smooth. E.
 P. cusickii Vas.
 HH. Lemma scabrous; leaf-blade scabrous.
 I. Glumes both linear-lanceolate and 1-veined. E.
 P. subaristata Scribn.
 II. Glumes wider, the lower 1-veined, the upper 3-veined. E.
 P. cottoni Pip.
 GG. Panicle loose.
 J. Flowers of the spikelet close; ligule of upper leaf 4 or more mm. long.
 E. *P. capillarifolia* S. & W.
 JJ. Flowers of the spikelet loose; ligule of the upper leaf 2—3 mm. long. E.
 P. idahoensis Beal
 FF. Leaves wider than filiform, often folded or rolled up.
 K. Lemma glabrous on the back. E.
 P. curtifolia Scribn.
 KK. Lemma hairy or scabrous on the back at least on the veins.
 L. Spikelets almost terete.
 M. Spikelets 4—5 mm. long; plant 1.5—3 dm. high. W. C. (*Sporobolus bolanderi*.)
 P. multnomae Pip.
 MM. Spikelets 6—9 mm. long; plant 3—6 dm. high. W.
 P. alcea Pip.
 LL. Spikelets much flattened.
 N. Spikelets 8—10 mm. long, 4—7-flowered. W. E. (*P. helleri*.)
 P. nervosa Vas.
 NN. Spikelets 5—7 mm. long, 2—4-flowered.

- O. Lemma strongly purple-tinged. W. C. E. (*P. purpurascens*; *P. subpurpurea*.)
 - P. paddensis* Wms. (Purple-top Blue-grass)
- OO. Lemma mostly greenish. W. C. E. (*P. epilis*; *P. incurva*.)
 - P. sandbergii* Vas.
- EE. Lateral veins of the lemma nearly parallel, not converging above.
 - P. Plant 0.5—2 dm. high. C. E. (*P. leibergii*.)
 - P. suksdorfii* Vas.
- PP. Plant 3—6 dm. high.
 - Q. Spikelets much flattened; lemma acute. E.
 - P. fendleriana* Vas. (Mutton-grass)
- QQ. Spikelets almost terete; lemma narrow but not acute. E.
 - P. lucida* Vas. (Yellow Spear-grass)

GROUP 3

- A. Plant spreading by creeping rootstocks and thus stems not densely tufted.
 - B. Seashore plant; leaves rolled up; leaf-blade 5—15 cm. long. W.
 - P. confinis* Vas.
 - BB. Not a seashore plant; leaves folded; leaf-blade 5—15 cm. long. C. E.
 - P. olneyae* Pip.
 - BBB. Not a seashore plant; leaves flat; leaf-blade 1—4 cm. long. E.
 - P. curtifolia* Scribn.
- AA. Plant without rootstocks and thus stems tufted.
 - C. Veins of the lemma pilose below. (See Group 2, BB.)
 - CC. Veins of the lemma not pilose, though often somewhat hairy.
 - D. Stems coarse, 6—10 dm. high.
 - E. Plant green or rarely slightly glaucous; leaves flat or rarely rolled up; panicle ample.
 - F. Ligule of upper leaf 4—8 mm. long.
 - G. Lemma scabrous; panicle dense. C. E.
 - P. canbyi* Pip.
 - GG. Lemma pubescent; panicle rather loose. E.
 - P. leckenbyi* Scribn. (Sand Blue-grass)
 - FF. Ligule of upper leaf 1—3 mm. long; panicle loose. E.
 - P. ampla* Mer.
 - EE. Plant glaucous; leaves rolled up; panicle narrow.
 - H. Leaves rolled up; glumes and lemmas unequal. E.
 - P. laevigata* Scribn.
 - HH. Leaves flat or folded; glumes and lemmas nearly or quite the same length.
 - I. Ligule of upper leaf about 4 mm. long. E.
 - P. nevadensis* Vas. (Nevada Blue-grass)
 - II. Ligule of upper leaf 1—2 mm. long. E.
 - P. brachyglossa* Pip.
 - DD. Stems not coarse, usually less than 6 dm. high, never tall.
 - J. Lemma smooth or merely scabrous on the back, not hairy.
 - K. Plant 2.5—7 dm. high.
 - L. Lemma minutely scabrous on the back. W. C. E.
 - P. saxatilis* W. & S.
 - LL. Lemma smooth on the back. E.
 - P. curtifolia* Scribn.
 - KK. Plant 0.5—2.5 dm. high.

- M. Leaves flat; lemma 2—3 mm. long, smooth. C.
P. lettermani Wats.
- MM. Leaves rolled up; lemma 5.5—6.5 mm. long, smooth. C.
P. pringlei Scribn.
- MMM. Leaves folded; lemma 3.2—7 mm. long, scabrous in nearly all.
 N. Glumes obovate, 3—5-veined, silvery-whitish. U.
P. argentea How. (Silvery Blue-grass)
- NN. Glumes ovate-lanceolate, 3-veined, not silvery-whitish. C. E.
P. vaseyochloa Scribn.
- JJ. Lemma hairy at least on the veins near the base.
- O. Lower glume long-acuminate. U.
P. acutiglumis Scribn.
- OO. Lower glume acute or obtuse.
- P. Panicle loose, its branches spreading or ascending.
- Q. Leaves rolled up or folded. E.
P. wheeleri Vas.
- QQ. Leaves flat. C. E. (*P. invaginata*.)
P. gracillima Vas. (Slender Spear-grass)
- PP. Panicle dense, its branches erect or very short.
- R. Spikelets strongly flattened.
- S. Seashore plant, 1—2 dm. high; plant dioicous. U.
P. douglasii Nees (Douglas Sand-grass)
- SS. Not a seashore plant, 2—4 dm. high; spikelets all alike. W.
 C. E. (See Group 2, O.)
- RR. Spikelets almost terete.
- T. Leaves yellowish-green; spikelets 2—6 mm. long. E.
P. lucida Vas. (Yellow Spear-grass)
- TT. Leaves dark-green; spikelets 6—10 mm. long. U. E. (*P. buckleyana stenophylla*.)
P. buckleyana Nash (Bunch Red-top)

GLYCERIA (Panicularia)

MANNA-GRASS

Perennial (ours) or rarely annual, sometimes aquatic. Leaf-blades usually flat. Spikelets several-flowered, terete or slightly flattened; panicle narrow or spreading; rachilla jointed between the flowers, usually glabrous; flowers perfect except sometimes the upper. Glumes unequal, shorter than the lemma, unawned, acute or obtuse, 1—5-veined. Lemma smooth or scabrous, unawned, obtuse, convex or flattish on the back, conspicuously 3—9-veined, herbaceous, veins not reaching apex; apex hyaline, obtuse, sometimes denticulate. Stamens 3. Grain glabrous, grooved, enclosed, not or slightly adherent. (Gk. glukeros=sweet; referring to the taste of the grain.)

A. Spikelets 1—2.5 cm. long, linear.

B. Lemma scabrous only on the veins, 3—5 mm. long. E.

G. borealis Pip. (Northern Manna-grass)

BB. Lemma scabrous all over the back, 6 mm. long. W. E.

G. fluitans R. Br. (Floating Manna-grass)

AA. Spikelets 2—8 mm. long, ovate or oblong.

C. Lemma 5-veined, broadly scarious-margined. W. C. E.

G. pauciflora Presl.

CC. Lemma 7-veined, hardly or not at all scarious-margined.

- D. Panicle 20—40 cm. long; spikelets 4—6 mm. long; lemma 2.5 mm. long.
W. E. (*G. grandis*.) *G. americana* (Torr.) (Reed Meadow-grass)
- DD. Panicle 10—20 cm. long; spikelets 2—4 mm. long; lemma 1.7—2.2 mm.
long. C. E. (*G. nervata elata*; *G. latifolia*.)

G. nervata Trin. (Fowl Meadow-grass)

PUCCINELLIA

SPEAR-GRASS

Perennial, tufted, mostly glaucous and saline species. Leaf-blades flat or involute. Spikelets 2—10-flowered, panicle open or contracted. Glumes obtuse or acute, unequal. Lemma obtuse or acute, rounded on the back, 5-veined, the veins very obscure or almost wanting, often minutely pubescent at base. Stamens 3. Grain compressed, enclosed, usually adherent. (Honor of B. Puccinelli, an Italian botanist.)

- A. Plants with slender rootstocks; lowest panicle-branches solitary or 2 together.
- B. Panicle 8—12 cm. long; spikelets 4—10-flowered, 6—12 mm. long; lemma 3—4 mm. long. W. *P. maritima* Parl. (Sea Spear-grass)
- BB. Panicle 3—8 cm. long; spikelets 2—4-flowered, 3—6 mm. long; lemma 3 mm. or less long. W. *P. angustata* R. & R. (Arctic Spear-grass)
- AA. Plants without rootstocks; lowest panicle-branches 3—6 together.
- C. Lower glume more than $\frac{1}{2}$ as long as the lowest flower; lowest panicle-branches 3—4 together; leaves mostly involute.
- D. Plant 3—4.5 dm. high; glumes not abruptly pointed. E.
P. lemmoni Scribn. (Lemmon's Spear-grass)
- DD. Plant 3—12 dm. high; glumes abruptly pointed. E.
P. airoides W. & C. (Slender Spear-grass)
- CC. Lower glumes less than $\frac{1}{2}$ as long as the lowest flower; lowest panicle-branches 4—6 together; leaves mostly flat. W. (*P. rubida*.)
P. distans Parl. (Spreading Spear-grass)

FESTUCA

FESCUE

Annual or perennial. Leaf-blades from filiform and rolled up to flat and several mm. wide. Spikelets 2- to many-flowered, in racemes or panicles; rachilla jointed above the glumes; flowers perfect or the upper one staminate. Glumes keeled, equal or unequal, the lower 1—3-veined, the upper 3—5-veined. Lemma awnless or awned, 5-veined, convex or somewhat keeled. Palet acuminate to obtuse or notched. Stamens 1—3. Grain linear or oblong, glabrous, convex on back, grooved or flat on one side, often adherent. (*L. festuca*=stalk, straw; hence applied to a straw-like grass growing in barley.)

- A. Annual; stamens 1—3.
- B. Spikelets 8—13-flowered. E.
F. octoflora Walt. (Slender Fescue)
- BB. Spikelets 1—6-flowered.
- C. Panicle short, at least its chief branches divergent.
- D. Glumes hairy.
- E. Lemma hairy. U. E.
F. confusa Pip.
- EE. Lemma not hairy. U. (*F. microstachys ciliata*.)
F. grayi Pip.
- DD. Glumes not hairy.
- F. Lemma hairy.
- G. Spikelets 3—5-flowered, 10—12 mm. long; glumes 6—7.5 mm. long.
E. *F. eriolepis* Desv.

- GG. Spikelets 1—3-flowered, 5—7 mm. long; glumes 3—5 mm. long.
 U. *F. microstachys* Nutt. (Small Fescue)
- FF. Lemma not hairy.
 H. Only the chief panicle-branches spreading; most of the spikelets 1—3-flowered. W. E.
F. pacifica Pip.
- HH. All the spikelets spreading; most of the spikelets 3—6-flowered. E.
(F. microstachys pauciflora.)
F. reflexa Buck.
- CC. Panicle narrow and long, its branches erect or appressed.
 I. Lower glume $1/3$ — $1/2$ as long as the upper.
 J. Lemma not ciliate. W.
F. myurus L. (Rat-tail Fescue)
- JJ. Lemma ciliate. W. E.
F. megalura Nutt.
- II. Lower glume $2/3$ — $3/4$ as long as the upper. W.
F. bromoides L.
- AA. Perennial; stamens 3.
- K. Awn as long as the lemma or longer.
- L. Leaf-sheath somewhat scabrous or hispid.
- M. Lemma-awn from a cleft apex, 8 mm. or less long; glumes lanceolate; flowers not stipitate. U.
F. elmeri S. & M.
- MM. Lemma attenuate into an awn; awn often over 8 mm. long; glumes subulate.
 N. Flowers not stipitate at base; leaf-blade scabrous beneath; panicle-rays mostly in groups of 2; upper glume 3-veined; lemma 3-veined. W. E. (*F. jonesii.*)
F. subulata Trin.
- NN. Flowers long-stipitate at base; leaf-blade smooth beneath; panicle-rays nearly always solitary; glumes both 1-veined; lemma 5-veined. W.
(F. denticulata.) F. subuliflora Scribn.
- LL. Leaf-sheath quite smooth and glabrous.
 O. New shoots coming from inside the leaf-sheath; stems 2-jointed; spikelets not glaucous. W. C. E. (*F. ovina polyphylla.*)
F. occidentalis Hook.
- OO. New shoots arising from outside the leaf-sheath; stems 3—4-jointed; spikelets often glaucous. *F. rubra* and varieties. (See R.)
- KK. Awn shorter than the lemma or none.
- P. Leaves narrow, involute; plants usually tufted.
- Q. Leaf-blades not dropping from their sheaths; palet obtuse.
- R. Leaf-blades quite smooth; young shoots arising outside the leaf-sheath; spikelets often glaucous.
- S. Spikelets glabrous or merely scabrous.
- T. Inflorescence not dense; stem-leaves flat or folded.
- U. Leaves and usually the spikelets also green.
- V. Spikelets 7—8 mm. long.
 W. Basal leaves involute, lemma linear-lanceolate. W. E.
(F. amethystina and F. rubra trichophylla for our region.)
F. rubra L. (Red Fescue)
- WW. Basal leaves flat; lemma lanceolate. E.
F. rubra multiflora A. & G.
- VV. Spikelets 10—12 mm. long. W. E.
F. rubra megastachys Gaud.

- UU. Leaves and spikelets glaucescent. E.
F. rubra glaucoidea Pip.
- TT. Inflorescence very dense; stem-leaves rolled up.
 X. Leaves green; spikelets glabrous or glaucous. W.
F. rubra densiuscula Pip.
- XX. Leaves very glaucous; spikelets very glaucous. W. (*F. rubra littoralis*.) *F. rubra pruinosa* Hack.
- SS. Spikelets pubescent with short hairs. W. E. (*F. rubra pubescens*.)
F. rubra kitaibeliana Pip.
- RR. Leaf-blades scabrous at margin or in their upper portion; young shoots arising within the leaf-sheath; spikelets not glaucous.
- Y. Panicle-rays not cushioned at base; spikelets 5—7.5 mm. long; glumes both linear-lanceolate, neither over 3 mm. long; lemma 3—3.5 mm. long. (Varieties of *F. ovina*, the Sheep Fescue.)
 Z. Leaf-blades capillary, 0.3—0.6 mm. wide.
 a. Plant 20—60 cm. high; panicle 2—12 cm. long. W.
F. ovina sciaphila A. & G.
 aa. Plant 12—30 cm. high; panicle 2—4 cm. long. W. C. E.
F. ovina supina Hack.
- ZZ. Leaf-blades wider.
 b. Leaf-blades green, smooth. E. (*F. brevifolia*.)
F. ovina brachyphylla Pip.
 bb. Leaf-blades pale or glaucescent, usually scabrous.
 c. Awn nearly equaling the lemma; leaf-sheath becoming spread out at base. C. E. (*F. ovina columbiana*; *F. ovina oregana*.)
F. ovina ingrata Hack.
 cc. Awn $1/5$ — $1/3$ as long as the lemma; leaf-sheath not becoming spread out at base. (*F. arizonica*.)
F. ovina arizonica Hack.
- YY. Rays of the panicle cushioned at the base; spikelets 8—12 mm. long; glumes wider, often at least one of them more than 3 mm. long; lemma 6—7 mm. long.
 d. Lemma glabrous; panicle 10—15 cm. long. C. E.
F. viridula Vas.
 dd. Lemma appressed-hispidulous; panicle 8—10 cm. long. U.
F. howellii Hack.
- QQ. Leaf-blades eventually dropping from their sheaths; palet notched at apex.
 e. Panicle 4—15 cm. long; ligules not conspicuously hairy. E.
F. hallii Pip.
 ee. Panicle 10—30 cm. long; ligules conspicuously hairy. (See f.)
- PP. Leaves flat, wide; plants not densely tufted.
 f. Stems mostly 2-jointed; upper glumes $1/5$ longer than the lower; lemma scabrous all over the back; palet notched at apex. U. (*F. californica*.)
F. aristulata Shea.
 ff. Stems mostly 3—4-jointed; upper glume $1/3$ longer than the lower; lemma scabrous near the tip; palet notched at apex. W. E.
F. elatior L. (Tall Fescue)
 fff. Stems mostly 2-jointed; upper glume $1/2$ longer than the lower; lemma scabrous all over the back; palet obtuse. E.
F. confinis Vas.

BROMUS

BROME

Annual or biennial or perennial. Leaves flat or nearly so. Spikelets numerous, 5—15-flowered, oval to lanceolate; pedicels thickened at the tip; flowers perfect except the upper one. Glumes unequal, acute, the lower 1—3-veined, the upper 3—9-veined. Lemma rounded or keeled on the back, 5—9-veined, usually 2-toothed at apex, awnless or awned from just below the tip. Palea-keels ciliate. Stamens 3. Stigmas arising below the hairy cushion-like top of the ovary. Grain adherent. (Gk. *broma*=food; *Bromus* was first the name of a wild oat.)

- A. Lemma-awn 0—16 mm. long.
 - B. Lemma glabrous or merely scabrous.
 - C. Spikelets strongly flattened.
 - D. Lemma 6—11 mm. long.
 - E. Leaf-sheath glabrous; lemma usually short-awned. W. E.
B. secalinus L. (Chess)
 - EE. Leaf-sheath pubescent; lemma usually awnless. E.
B. brizaeformis F. & M. (Quake Brome)
 - DD. Lemma 12—18 mm. long.
 - F. Lower glume 3-veined, 6—8 mm. long; lemma 7-veined. E.
B. polyanthus Scribn.
 - FF. Lower glume 5-veined, 12—16 mm. long; lemma 9-veined. W. E.
(*B. hookerianus*.) *B. carinatus hookerianus* Shear
 - CC. Spikelets terete or nearly so.
 - G. Awn of lemma bent or twisted, 10—12 mm. long. E.
B. japonicus Thurb.
 - GG. Awn of lemma straight or none, often shorter.
 - H. Leaf-sheath glabrous or nearly so; lower glume 1-veined; upper glume 3-veined; rays of the panicle mostly 5—7 in a bunch. W. E.
B. inermis Leyss. (Hungarian Brome)
 - HH. Leaf-sheath pubescent; lower glume 1—3-veined; upper glume 3—9-veined.
 - I. Upper glume 3-veined; perennial; rays of the panicle mostly 2—3 in a bunch. C. E. *B. orcuttianus* Vas.
 - II. Upper glume 7—9-veined; annual or biennial; rays of the panicle mostly 3—5 in a bunch.
 - J. Panicle dense, erect; lemma 9—10 mm. long. E.
B. hordeaceus glabrescens Shear
 - JJ. Panicle loose, spreading.
 - K. Panicle 7 cm. or less long, erect; lemma 6—8 mm. long. W.
B. racemosus L. (Upright Chess)
 - KK. Panicle 15 cm. or less long, drooping; lemma 9—10 mm. long. W. E.
B. racemosus commutatus Hook.
 - BB. Lemma hairy.
 - L. Spikelets much flattened.
 - M. Lemma-awn none or less than 7 mm. long.
 - N. Lemma obtuse, its awn 0—1 mm. long. E.
B. brizaeformis F. & M. (Quake Brome)
 - NN. Lemma acute, its awn 3—6 mm. long.
 - O. Leaves linear-lanceolate, flat, pilose.

- P. Glumes scabrous. W. E. (*B. marginatus latior*.)
B. marginatus Nees
- PP. Glumes glabrous or scabrous on the veins only. W.
B. marginatus seminudus Shear
- OO. Leaves linear, somewhat rolled up, finely pubescent, not pilose. E.
B. subvelutinus Shear
- MM. Lemma-awn more than 7 mm. long.
- Q. Lower rays of the panicle drooping. W. C.
B. sitchensis Trin.
- QQ. Lower rays of the panicle not drooping. W. E.
B. carinatus H. & A.
- LL. Spikelets terete or nearly so.
- R. Lemma-awn 10—16 mm. long; lower glume 1-veined.
- S. Annual; leaves and sheaths pubescent; lemma 5-veined. E.
B. tectorum L. (Downy Brome)
- SS. Perennial; leaves and sheaths glabrous or pilose; lemma 7-veined.
- T. Sheaths and leaves glabrous. (*B. vulgaris eximus*.) C. E.
B. eximus Pip.
- TT. Sheaths and leaves more or less pilose. W. C. E. (*B. eximus umbraticus*; *B. vulgaris*; *B. vulgaris robustus*.)
B. eximus robustus Pip.
- RR. Lemma-awn 4—8 mm. long.
- U. Glumes glabrous or merely scabrous.
- V. Panicle-branches not drooping. C.
B. suksdorfii Vas.
- VV. Panicle-branches drooping.
- W. Lower glume 1-veined; rootstocks none. W. E. (*B. richardsonii pallidus*.)
B. richardsonii Link.
- WW. Lower glume 3-veined; rootstocks present. E.
B. laevipes Shear
- UU. Glumes pubescent or pilose.
- X. Stem 9—18 dm. high; pubescent below the panicle; leaves 20—25 cm. long, 8—14 mm. wide; panicle-branches drooping. W.
B. pacificus Shear
- XX. Stem 2—9 dm. high, glabrous except at the nodes; leaves 2.5—17.5 cm. long, 2—6 mm. wide; panicle-branches not drooping.
- Y. Lower glume 1-veined; lemma 10—14 mm. long, pubescent; lemma-awn 3—5 mm. long, bent and twisted; perennial. W. (*Trisetum barbatum*.)
B. barbatoides Beal
- YY. Lower glume 3-veined; lemma 7—9 mm. long, pilose; lemma-awn 6—8 mm. long, straight; annual. W. E.
B. hordeaceus L. (Soft Brome)
- AA. Lemma-awn 17—25 mm. long; plant annual or biennial; lower glume 1-veined.
- Z. Stem somewhat pubescent toward the top; panicle dense, ovoid, head-like. E.
B. rubens L.
- ZZ. Stem glabrous; panicle loose, at least its lower branches spreading.
- a. Spikelets 3.6—5 cm. long; glumes somewhat scabrous. U.
B. midritensis L.
- aa. Spikelets 2.5—3.5 cm. long; glumes glabrous. W. E.
B. sterilis L.

AAA. Lemma-awn 35—65 mm. long; annual; lower glume 1-veined.

b. Leaf-sheath scabrous; lemma-awn 3.5—4.5 cm. long. E.

B. maximus Desf.

bb. Leaf-sheath hairy; lemma-awn 5—6.2 cm. long. W. (*B. gussoni*.)

B. maximus gussoni Parl.

CHLORIDEAE (BERMUDA-GRASS TRIBE)—Spikelets 1- to several-flowered, in spikes or racemes; spikes 1-sided, digitately or racemosely arranged, rarely solitary. Lemma usually keeled, either entire and unawned or else toothed and with 1—3 straight awns. Grain unfurrowed, free.

A. Spikelets 6—14 mm. long; lower glume about $\frac{1}{2}$ as long as the upper including awn-point if present.

B. Plants 3—18 dm. high; lemma obtuse or emarginate, not awn-pointed, 1-veined, no sterile lemma above the first flower. SPARTINA (p. 67)

BB. Plants 1.5—4.5 dm. high; lemma 3-pointed, each point with a short awn, 3—5-veined, with 1—3 sterile lemmas above the first flower.

BOUTELOUA (p. 68)

AA. Spikelets 2—4 mm. long; lower glume $\frac{2}{3}$ —1 as long as the upper.

C. Spikes all or nearly all from the tip, widely spreading when mature; rachilla jointed above the glumes.

D. Perennial; spikelets 1-flowered, 2 mm. long. CYNODON (p. 67)

DD. Annual; spikelets several-flowered, 3—4 mm. long. ELEUSINE (p. 68)

CC. Spikes scattered along a common axis, rather closely applied to this axis; rachilla jointed below the glumes.

BECKMANNIA (p. 68)

SPARTINA

CORD-GRASS

Perennial, with creeping rootstocks, often maritime (not ours). Leaf-blades long, tough, coarse; leaf-sheath smooth. Spikelets 1-flowered, flattened, sessile, articulate with the pedicels, closely imbricated in 2 rows along 2 sides of a triangular rachis thus forming 1-sided spikes; these spikes scattered along a common axis; rachis prolonged beyond the base of the upper spikelet. Glumes keeled, acute or bristle-pointed, unequal, the second usually exceeding the lemma. Lemma obtuse, 1-veined, thinner than the glumes. Palet slender, equal to or longer than the lemma, almost hyaline. Stamens 3. (Gk. spartine—a cord; referring to the tough slender leaves.)

A. 10—20 dm. high; spikelets 12—14 mm. long. E. (*S. pectinata*; *S. cynosuroides* for our region.) *S. michauxiana* Hitch. (Slough-grass)

AA. 3—9 dm. high; spikelets 6—9 mm. long. E.

S. gracilis Trin. (Western Cord-grass)

CYNODON (Capriola)

BERMUDA-GRASS

Perennial, tufted or creeping. Leaf-blades narrow, flat. Spikelets 1-flowered, sessile, in 2 rows on 1 side of a slender axis; spikes digitately arranged at top of stem; rachilla jointed above the glumes, prolonged behind the perfect flower as a slender naked bristle and bearing 1 or more rudimentary lemmas. Glumes unequal, narrow, keeled, acute. Lemma obtuse, slightly longer than the glumes, 1—3-veined; mid-vein nearly always prolonged into a slender awn. Palet about as long as the glume, 2-keeled. Stamens 3. Grain smooth, oblong, enclosed. (Gk. kyon=dog, odons=a tooth; the 1-sided spike suggesting a row of dog-teeth.) W. E.

C. dactylon Pers.

BOUTELOUA

GRAMA-GRASS

Annual or perennial (ours), slender. Leaf-blades narrow, flat or convolute. Spikelets 1—2-flowered, sessile, densely crowded in 2 rows on 1 side of a flattened spike-rachis; spikes solitary or in a raceme; rachis projecting beyond the base of the upper spikelet; rachilla jointed above the glumes, with 1—3 lemmas or bristles or rarely staminate flowers above the perfect flower. Glumes narrow, acute, keeled, equal or unequal (ours). Lemma wider than the glumes, 3—5-toothed or -cleft at the apex and 3 of the divisions usually awned (ours), 3—5-veined. Palet narrow, hyaline, entire or 2-toothed, 2-keeled, about as long as the lemma. Stamens 3. (Honor of C. Boutelou, a Spanish agriculturist.) E.

B. oligostachya Torr.

BECKMANNIA

Perennial, erect, rather tall. Leaf-blades flat. Spikelets 1-flowered (ours) or 2-flowered, broad, flattened, subsessile, closely imbricate in 2 rows on 2 sides of a 3-angled rachis thus forming short slender spikes; spikes arranged in a terminal long narrow panicle; rachilla jointed below the glumes. Glumes chartaceous, subequal, boat-shaped, flattened, obtuse or bluntly pointed, scarious-margined. Lemma lanceolate, acuminate, thin. Palet hyaline, 2-keeled, nearly as long as the lemma. Stamens 3. In wet places. (Honor of J. Beckmann, a German botanist.) E.

B. erucaeformis Host. (Slough-grass)

ELEUSINE

Annuals, coarse, tufted or creeping. Spikelets several-flowered, awnless, flat, imbricate in 2 rows along 1 side of a rachis thus forming a spike; spikes arranged digitately at the end of the stem or somewhat racemose; rachis not extending beyond the upper spikelet; rachilla jointed above the glumes; flowers perfect or the upper one staminate. Glumes unequal, the second the longer, shorter than the flowers, thin, rigid, obtuse. Lemma with a thickened 5-ribbed keel, wider than the glumes. Palet short, acute, the narrowly winged keels distant. Stamens 3. Grain black, with comb-like lines. W. E. (Ceres, the Greek goddess of the harvests, was worshipped in the town of Elusin.) *E. indica* Gaert. (Yard-grass)

HORDEAE (BARLEY TRIBE)—Leaf-blade with a more or less well-marked pair of auriculate appendages at the base. Inflorescence a spike, with 1 or more spikelets at each joint of the rachis; rachis zigzagged, channeled. Spikelets sessile in the alternate notches of the rachis, 1- to many-flowered. Glumes awnless or awned, or none. Upper flowers of the spikelet imperfect.

A. Spikelets solitary at each joint of the rachis.

B. Spikes 4 mm. or less wide; spikelets 1-flowered. SCRIBNERIA (p. 69)

BB. Spikes 5 mm. or more wide; spikelets 3- to several-flowered.

C. Spikelets placed with edge to the rachis; glumes 1, or in the terminal spikelet 2. LOLIUM (p. 69)

CC. Spikelets placed with flat side to the rachis; glumes 2.

D. Lemma with distinct callus at base, falling at maturity with the grain; grain adherent to the palet. AGROPYRON (p. 69)

DD. Lemma without a distinct callus, persisting after the grain has fallen; grain free from the palet.

E. Glumes subulate, 1-veined.

SECALE (p. 71)

EE. Glumes lanceolate or ovate, 3- to many-veined. TRITICUM (p. 71)

AA. Spikelets 2—3 at each joint of the rachis.

F. Spikelets 3 at each joint of the rachis, 1-flowered.

HORDEUM (p. 71)

FF. Spikelets 2 at each joint of the rachis, 2- to many-flowered.

G. Glumes entire; rachis continuous, rarely breaking into pieces. ELYMUS (p. 72)

GG. Glumes 2- to many-parted or -cleft; rachis jointed, readily falling into pieces. SITANION (p. 73)

LOLIUM

RYE-GRASS

Annual or perennial, erect. Leaves flat. Spikelets in a simple terminal spike, several-flowered, solitary and sessile at the joints of the rachis, alternate, edge-wise to the rachis; rachis somewhat zigzag; rachilla jointed between the flowers. Glume 1 except in the terminal spikelet, opposite the rachis. Lemma rounded on the back, 5—7-veined, obtuse or acute or awned. Palet 2-keeled. Stamens 3. Grain smooth, adherent. (Latin name.)

A. Perennial; glumes shorter than the spikelet (less the awns); leaf-sheaths shorter than the internodes. W. L. perenne L. (Perennial Rye-grass)

AA. Annual; glumes equaling or exceeding the spikelet (less the awns); leaf-sheaths longer than the internodes. W.

L. temulentum L. (Darnel)

SCRIBNERIA

Annual, slender, 0.5—3 dm. high. Leaves short, narrow. Spikelets in a spike, solitary or in 2's at the joints of the rachis, 1-flowered, perfect; spike slender, simple; rachilla extending very slightly beyond the palet. Glumes narrow, rigid, acute, slightly unequal, strongly keeled. Lemma shorter than the glumes, membranous, keeled, 2-toothed at apex, awned between the teeth; callus hairy. Palet acutely 2-toothed. Stamen 1. Grain linear, nearly terete. (Honor of F. Lamson-scribner, an American agrostologist.) U. C.

S. bolanderi Hack. (Thread-head)

AGROPYRON

BUNCH-GRASS

Perennial; stem erect, simple. Spikelets in a spike, 3- to many-flowered, closely sessile, 1 at each joint of the rachis; rachilla jointed under each flower. Glumes narrower and usually shorter than the lemma, acute or awned. Lemma rounded on the back or slightly keeled above, 5—7-veined, acute or awned from the apex, rarely obtuse. Palet 2-keeled, bristly-ciliate on the keels. Grain pubescent at apex, usually adherent. (Gk. agros=field, pyros=wheat; they were weeds in wheat.)

A. Plants densely tufted, not or hardly producing rootstocks; lemma not hairy.

B. Glume-awns 1—2.5 cm. long; glumes 4—6 mm. long.

C. Herbage pubescent; spike dense. E. (*Elymus saxicolus*.)

A. saxicola Pip.

CC. Herbage glabrous; spike loose. E. (*Sitanion flexuosum*.)

A. flexuosum Pip.

BB. Glume-awns either none or more than 1 cm. long.

D. Some of the lemma-awns longer than their lemmas.

- E. Glumes exceeding the lower lemma (less the awns); lemma-awns erect, not at all divergent. E. (*A. caninum*.)
A. richardsoni Schrad.
- EE. Glumes shorter than the lower lemma (less the awns); lemma-awns divergent or widely spreading.
- F. Glumes attenuate into a scabrous awn.
- G. Spikes 4—7 cm. long; rachis readily breaking at joints; glumes 5—8 mm. long (less the awn). C. E.
A. scribneri Vas.
- GG. Spikes 10—25 cm. long; rachis not readily breaking at joints; glumes 10—14 mm. long (less the awn). E.
A. gmelini S. & S.
- FF. Glumes awnless.
- H. Leaves glabrous or nearly so.
- I. Lemma-awn 0—1 cm. long. E. (*A. divergens tenuispicatum*; *A. spicatum tenuispicatum*; *A. divergens*.)
A. spicatum S. & S. (Wheat Bunch-grass)
- II. Lemma-awn 1.2—2.5 cm. long. E. (*A. divergens inerme*; *A. vaseyi*; *A. spicatum vaseyi*.)
A. spicatum inerme Hel.
- HH. Leaves pubescent on both sides. E.
A. spicatum puberulentum Pip. (Wire Bunch-grass)
- DD. Lemma-awns shorter than their lemmas or none.
- J. Spikelets flattened. (See II.)
- JJ. Spikelets terete or nearly so.
- K. Lower glume 3-veined.
- L. Leaves 3.5—9 cm. long; glumes scabrous on the keel. E.
A. brevifolium Scribn.
- LL. Leaves 7.5—20 cm. long; glumes scabrous on the margin. E.
A. biflorum R. & S.
- KK. Lower glume 5-veined.
- M. Spikes 3—10 cm. long; glumes mostly widest above their middle. E.
A. violaceum Vas.
- MM. Spikes 8—20 cm. long; glumes mostly widest below their middle. E. (*A. tenerum longifolium*; *A. pseudorepens*; *A. pseudorepens magnum*.)
A. tenerum Vas.
- AA. Plants not tufted, stems from creeping rootstocks.
- N. Lemma hairy.
- O. Lemma villous; spike rather dense.
- P. Spikelets 5—7-flowered. E. (*A. dasystachyum subvillosum*.)
A. subvillosum Pip.
- PP. Spikelets 7—13-flowered. E.
A. occidentalis molle Scribn.
- OO. Lemma puberulent; spike long and not dense. E. (*A. elmeri*.)
A. lanceolatum S. & S.
- NN. Lemma not hairy.
- Q. Leaves smooth beneath, pubescent above. W. E.
A. repens Beauv. (Couch-grass)
- QQ. Leaves rough on both sides.
- R. Spikelets 4—7-flowered. (See MM.)
- RR. Spikelets 7—13-flowered. W. E. (*A. smithii*.)
A. occidentalis Scribn. (Blue-joint)

SECALE

RYE

Annual, erect. Leaves flat. Spikelets in a dense spike, usually 2-flowered, sessile, solitary, at the notches of the continuous rachis. Glumes very narrow, rigid, subulate-pointed. Lemma wider than the glumes, sharply keeled at base, 5-veined, long-awned from apex. Palet a little shorter than the lemma, narrow, 2-keeled. Stamens 3. Grain oblong, nearly terete, grooved, hairy at tip, free. (Celtic sega=sickle; hence a grain for cutting.) W. E.
S. cereale L. (Cultivated Rye)

TRITICUM

WHEAT

Annual or biennial, erect. Leaves flat. Spikelets in a 2-sided spike, 2—5-flowered, 1 at each notch of the rachis. Glumes rigid, 3- to many-veined, 1- to many-awned or abruptly toothed at tip. Lemma rounded on the back, many-veined, with 1 to several teeth or awns at tip. Stamens 3. Stigmas plumose. Grain flat or oblong, deeply grooved, hairy at tip, free or adherent. (L. tritum=rubbed or ground; because it was made into flour.) W. E.

T. vulgare L. (Cultivated Wheat)

HORDEUM

BARLEY

Annual or perennial. Leaves flat. Spikelets in spikes, 2—3 together at a joint of the rachis, sessile or short-stalked, often only 1 fertile in a cluster, 1-flowered, awned, lateral ones usually imperfect and short stalked; spikes terete; rachilla jointed above the glumes, that of the central spikelet extending beyond the palet and sometimes bearing a rudimentary second flower. Glumes setaceous to narrowly lanceolate, rigid, persistent. Lemma lanceolate, rounded on the back, obscurely 5-veined above, usually awned. Palet shorter than the lemma, 2-keeled. Stamens 3. Grain hairy at tip, grooved, adherent. (Latin name for barley.)

A. Only the central spikelet of each group fertile.

B. Lemma-awn of the central spikelet 3.5—6 cm. long, of the lateral spikelets over half the lemma. W. E.

H. jubatum L. (Squirrel-tail Grass)

BB. Lemma-awn of the central spikelet 1.8—3 cm. long, of the lateral spikelets over half the lemma.

C. Central spikelet plainly stalked, its glumes ciliate. W. E.

H. murinum L. (Wall Barley)

CC. Central spikelet sessile, its glumes not ciliate.

D. Blades and sheaths of leaves glabrous. W. E.

H. caespitosum Scribn.

DD. Blades and sheaths of leaves pilose. E.

H. comosum Presl.

BBB. Lemma-awn of the central spikelet 0.4—1.2 cm. long, of the lateral spikelets not over half the lemma.

E. Lateral spikelets with perfect flowers. E.

H. boreale S. & S.

EE. Lateral spikelets with neutral flowers.

F. All the glumes of each cluster tapering from the base.

G. Leaf-blades finely pubescent; inner glumes of the lateral spikelets about twice as wide as the outer. U.

H. gussoneanum Parl.

- GG. Leaf-blades scabrous; both glumes of the lateral spikelets about the same width. W. E. (*H. nodosum depressum*)
H. nodosum L. (Wild Barley)
- FF. 3—4 of the glumes of each cluster widest above the base.
 H. Leaves rough above, smooth beneath; spikes 4—6 times as long as wide.
 E. *H. pusillum* Nutt. (Little Barley)
- HH. Leaves smooth on both sides; spikes 2—3 times as long as wide. U.
 (*H. maritimum*.) *H. geniculatum* All. (Sea Barley)
- AA. All 3 spikelets of each group fertile, the spike thus 6-rowed. W. E.
H. hexastichon L. (Cultivated Barley)

Elymus

WILD RYE

Annual or perennial. Leaves flat. Spikelets 2—9-flowered, sessile, in clusters of 1—4, in a spike; rachis continuous or jointed. Glumes nearly equal, narrow, 1—3-veined, acute or awned, persistent. Lemma shorter than the glumes, rounded on the back, obscurely 5-veined, acute or obtuse or awned from the apex. Palea a little shorter than the lemma, 2-keeled. Stamens 3. Grain hairy at top, adherent. (Gk. *elyein*=to roll up; in some species the spikes are somewhat rolled up in the leaf-sheaths.)

- A. Glumes and lemmas puberulent or ciliate or more hairy.
 B. Lemma-awn 0—5 mm. long.
 C. Glumes nearly equal, nearly equaling the spikelet. W. (Apparently *E. mollis* of How. Fl.) *E. arenarius* L. (Sea Lyme-grass)
- CC. Glumes either very unequal or else not over $\frac{2}{3}$ as long as the spikelet.
 D. Lemma long-villous; lower glume not over $\frac{2}{3}$ the upper. E.
E. flavescens S. & S. (Yellow Wild Rye)
- DD. Lemma puberulent or pubescent; glumes equal or nearly so.
 E. Glumes mere bristles; lemma 8—10 mm. long. E.
E. innovatus Beal
- EE. Glumes too wide to be bristles; lemma 10—12 mm. long.
 F. Spike dense, 7—15 cm. long; glumes 14—16 mm. long. W. E.
 (*E. vancouveriensis*.)
E. dasystachys Trin.
- FF. Spike not dense, 15—25 cm. long; glumes 8—12 mm. long. E.
 (*E. littoralis* of How. Fl.)
E. arenicola S. & S.
- BB. Lemma-awn 2—5 cm. long; glumes subulate, nearly equaling the spikelet (less the awns). E. (*Sitanion brodiaei*.)
E. canadensis L. (Nodding Wild Rye)
- AA. Glumes glabrous or merely scabrous; lemmas puberulent or ciliate or more hairy.
 G. Lemma-awn 1 cm. or more long.
 H. Perennial; lemma and its awn 1—3 cm. long; spikelets 3—6-flowered. W.
E. borealis Scribn.
- HH. Annual; lemma and its awn 5—7 cm. long; spikelets 1—2-flowered. U.
 E. *E. caputmedusae* L.
- GG. Lemma-awn less than 1 cm. long.
 I. Spike interrupted; spikelets 5—9-flowered; lemma 12—14 mm. long. (See FF.)
 II. Spike not interrupted; spikelets 3—6-flowered; lemma 8—10 mm. long.
 J. Leaf-sheaths glabrous and smooth; stem glabrous. E.
E. condensatus Presl. (Giant Wild Rye)

- JJ. Leaf-sheaths villous-pubescent; stem hairy near the nodes. E.
E. condensatus pubens Pip.
- AAA. Lemmas and glumes both glabrous or merely scabrous.
- K. Lemma-awn 0—5 mm. long.
- L. Glumes awl-shaped; lemma-awn 3—5 mm. long. E.
E. aristatus Mer.
- LL. Glumes lanceolate; lemma often awnless.
- M. Spikelets 4—8-flowered; glumes 6—12 mm. long. E.
E. triticoides Buckl.
- MM. Spikelets 2—4-flowered; glumes 12—15 mm. long.
- N. Glumes longer than the spikelet, rigid. E.
E. virginicus submuticus Hook. (Virginia Wild Rye)
- NN. Glumes shorter than the spikelet, not rigid. W.
E. virescens Pip.
- KK. Lemma-awn 6—10 mm. long; glumes longer than the spikelet (less the awns).
 E. *E. macounii* Vas.
- KKK. Lemma-awn 8—30 mm. long; glumes shorter than the spikelet (less the awns).
 O. Leaf-sheaths glabrous; leaf-blade smooth or scabrous above; lemma slightly scabrous. W. E. *E. glaucus* Buckl. (Smooth Wild Rye)
- OO. Leaf-sheaths hairy; leaf-blade hairy above; lemma glabrous. W.
E. marginalis Rydb.
- KKKK. Lemma-awn 30—50 mm. long; glumes apparently 4, shorter than the spikelet (less the awns). E. (*Sitanion leckenbyi*)
E. leckenbyi Pip.

SITANION

BRISTLY WILD RYE

Perennial, caespitose. Leaves flat. Spikelets 1—3 at each joint of the rachis, 2- to several-flowered, rachis jointed, easily breaking into pieces. Glumes awned, many-parted from near the base or merely 2-cleft or entire and subulate; an apparent 3rd glume setaceous when present. Lemma either with 1 terminal awn, or else 3-cleft and each lobe with a terminal awn. Palet as long as the lemma, entire or 2-awned or 2-toothed. Stamens 3. Grain hairy at tip, adherent. (Gk. sitas=wheat or grain; likely because the plants have wheat-like heads.)

- A. Glumes with 3 to many lobes or divisions; lemma-awns 8—10 cm. long. E. (*S. villosum*).
S. jubatum Sm.
- AA. Glumes entire or with 2 lobes or divisions; lemma-awns less than 8 cm. long.
- B. Glumes 3—5-veined.
- C. Leaves green, 2—5 mm. wide. C.
S. rubescens Pip.
- CC. Leaves glaucous, 5—8 mm. wide. W. C.
S. planifolium Sm.
- BB. Glumes 2-veined.
- D. Leaf-sheaths pubescent.
- E. Leaves pubescent on both sides; middle lemma-awn 1.5—4 cm. long. E. (*S. ciliatum*; *S. velutinum*).
S. hystrix Sm.
- EE. Leaves pubescent beneath, scabrous above; middle lemma-awn 4—7 cm. long. E. (*S. elymoides*).
S. montanum Sm.
- DD. Leaf-sheaths glabrous or glabrate or scabrous.

F. Basal leaves 1.5—3 dm. long, flexuous. E.

S. longifolium Sm.

FF. Basal leaves 0.5—1 dm. long. W. C. E. (*S. basalticola*; *S. latifolium*; *S. rigidum*; *S. glabrum*.)

S. brevifolium Sm.

CYPERACEAE

Sedge Family

Herbs, annual or perennial; rhizomes present; stems 3-angled or terete, mostly solid. Leaves attenuate, mostly basal; *sheaths not split*. Flowers in *spikes or spikelets*, small, perfect or monoicous or dioicous, in the axils of scales; scales imbricate, chaffy; spikes again variously grouped unless solitary. *Perianth none or of mere bristles or scales*. Stamens usually 2—3, hypogynous; *anthers basifixed*. Ovary 1-celled; ovule 1; style 2—3-cleft. *Fruit an akene*, lens-shaped or somewhat 3-angled, membranous or crustaceous or bony.

A. Akenes not enclosed in a sac-like structure; flowers perfect; spikelets all alike.

B. Spikelets more or less flat; scales in 2 opposite rows.

C. Stem nearly naked; leaves mostly basal; perianth none. CYPERUS (p. 75)

CC. Stem with 3 distinct rows of leaves; leaves mostly on the stem; perianth of 6—9 bristles. DULICHIMUM (p. 75)

BB. Spikelets terete; scales imbricated all around.

D. Akenes not crowned by the bulbous base of the style.

E. Spikelets not a cottony mass.

F. Perennial; perianth of 0—6 bristles. SCIRPUS (p. 76)

FF. Annual; perianth of a single hyaline scale between the rachilla and the akene. HEMICARPHA (p. 74)

EE. Spikelets each a white to brown cottony head of hairs 1—3 cm. wide. ERIOPHORUM (p. 75)

DD. Akenes crowned with the persistent bulbous base of the style.

G. Stem leafless; spikelets solitary, terminal; perianth-bristles usually present, 0—12. ELEOCHARIS (p. 77)

GG. Stem leafy at least at base; spikelets more than 1, in an involucre umbel.

H. Akene 3-angled; perianth-bristles none. STENOPHYLLUM (p. 78)

HH. Akene lens-shaped; perianth-bristles 9—15, downwardly barbed.

RHYNCHOSPORA (p. 78)

AA. Akenes enclosed in a sac-like structure; flowers monoicous; spikes mostly of 2 kinds. CAREX (p. 78)

HEMICARPHA

HEMICARPHA

Low, tufted, mostly annual; stems erect or spreading, almost filiform. Leaves almost filiform. Spikelets terete, small, terminal, solitary or in a head-like cluster; involucre 1—3-leaved; scales spirally imbricate all around, deciduous, all with perfect flowers in their axils, with 1 hyaline bract on inner face. Perianth-bristles none. Stamens 1—3. Style 2-cleft, deciduous, not swollen at base. Akene oblong, turgid or lens-shaped. Ours in moist sandy soil. (Gk. hemi=half, karphe=chaff; because this genus has only 1 inner scale while most related genera have 2 or more.)

A. Scales spreading, 2—3 times as long as the akenes.

B. Scales broadly ovate, with long-acuminate spreading tip; akene brown. C.

H. occidentalis Gray

BB. Scales oblong-ovate or obovate, with short-acuminate tip; akene black. E.

(*H. intermedia*.)

H. aristulata Nels.

- AA. Scales not spreading or only at the tip, very little longer than the akenes. C. (*H. subsquarrosa*.)
H. micrantha Brit.

CYPERUS

Stems mostly 3-angled, simple, leafy at base, with 1 or more leaves at the summit forming an involucre to the inflorescence. Peduncles or rays unequal, sheathed at base. Spikelets few- to many-flowered, mostly flat, variously arranged but ours again grouped in head-like clusters or radiating spikes; scales 2-ranked, deciduous when old. Stamens 1—3. Style 2—3-cleft, deciduous. Akene lens-shaped or 3-angled, naked at apex. Ours in moist and sandy soil. (Kupeiros—the ancient Greek name for these plants.)

- A. Leaves other than those of the involucre 2 mm. or less wide; spikelets in head-like clusters.

B. Annual; spikelets 4—8 mm. long; persistent but the scales falling from the axis at maturity; scales 3—7-veined; stamen 1.

- C. Scales tapering to slender recurved tips; plants 2.5—15 cm. high; akene widest at the top. C. E.

C. inflexus Muhl. (Awned Cyperus)

- CC. Scales acute but without recurved tips; plants 7.5—38 cm. high; akene widest at the middle. E.

C. acuminatus T. & H.

- BB. Perennial; spikelets 8—17 mm. long, the whole spikelet dropping off at maturity; scales 9—13-veined; stamens 3. E.

C. houghtoni Torr.

- AA. Leaves other than those of the involucre 3—8 mm. wide; spikelets grouped in radiating spikes.

D. Leaves all linear, with blade; scales falling from persistent spikelet-axis at maturity; akene less than 3 times as long as thick.

- E. Wings of spikelet-axis persistent; spikelet 3 mm. wide; scales straw-color or yellowish-brown; akene obtuse at apex. E.

C. esculentus L. (Yellow Nut-grass)

- EE. Wings of spikelet-axis separating from it as 2 anterior scales; spikelet less than 2 mm. wide; scales bright chestnut-brown; akene pointed at apex. W. E.

C. erythrorhizos Muhl. (Red-rooted Cyperus)

- DD. Leaves at base reduced to mere sheaths; whole spikelet dropping off at maturity; akene 3—4 times as long as thick. C.

C. strigosus L. (Straw-colored Cyperus)

DULICHIMUM

Perennial, tall; stems terete, hollow, jointed, leafy to the top. Lower leaves reduced to sheaths. Spikes axillary, peduncled, simple or compound. Spikelets 2-ranked, flat, linear, many-flowered; scales 2-ranked, keeled, folded lengthwise, decurrent on the joint below. Flowers perfect. Perianth of 6—9 retrorsely barbed bristles. Stamens 3. Style 2-cleft at the summit, persistent as a beak on the summit of the akene. Akene linear-oblong. In swamps and at borders of lakes. (Gk. duo=2, leichen=a scale; the scales of the spikelets are in 2 ranks.) W. (*D. spathaceum*.)

D. arundinaceum Brit. (Dulichium)

ERIOPHORUM

COTTON-GRASS

Perennial by rootstocks; stems erect, 3-angled or nearly terete. Leaves linear, 1—2 of the upper reduced to bladeless sheaths. Spikelets terminal, solitary or in heads or

umbels, naked or subtended by a 1- to several-leaved involucre; scales spirally imbricate, usually all fertile. Flowers perfect. Perianth of 6 or numerous bristles; bristles filiform, smooth, soft, white or brown, straight or crisped, exerted much beyond the scales at maturity. Stamens 1—3. Style 3-cleft. Akenes 3-angled, oblong or ellipsoid or obovoid. Ours in bogs. (Gk. erion=wool or cotton, phoros=bearing; referring to the cottony spikes.)

A. Spikelet 1; lowest scale of spikelet enlarged and thickened but otherwise without involucre.

B. Perianth-bristles reddish-brown. W. (*E. russeolum*.)

E. chamissonis Mey. (Brown Rabbit's-tail)

BB. Perianth-bristles white. W. (Apparently *E. scheuchzeri*.)

E. chamissonis albidum Fern. (White Rabbit's-tail)

AA. Spikelets 2—several; involucre of 1—several leafy bracts.

C. Leaves 1—1.5 mm. wide, triangular-channelled thruout; involucre-bract 1, short, erect. W. C. E. *E. gracile* Roth (Slender Cotton-grass)

CC. Leaves wider, flat at least below the middle; involucre-bracts 2 or more. C. E. *E. polystachion* L. (Coarse Cotton-grass)

SCIRPUS

BULRUSH

Annual or perennial, tufted; with creeping rootstocks. Spikelets 1 or more, terminal but often apparently lateral, in head-like or umbel-like clusters when several, several- to many-flowered, scaly, with or without involucre subtending the clusters; scales closely imbricated around the rachilla, lower 1—2 often empty. Perianth of 0—6 bristles. Stamens 1—3. Style 2—3-cleft, scarcely or not at all thickened at base, deciduous or only the base persistent. Akenes lens-shaped or 3-angled or obovoid. (The Latin name of the bulrush.)

A. Spikelet only 1, terminal.

B. Involucre-bracts none.

C. Akene 2—2.5 mm. long, its beak continuous with its body. C. E. *S. pauciflorus* Lft.

CC. Akene 1 mm. long, constricted below the beak. W. *S. nanus* Spreng.

BB. Involucre-bracts present.

D. Involucre-bracts shorter than the spikelet.

E. Perianth-bristles none. W. *S. riparius* Spreng.

EE. Perianth-bristles 6, smooth. W. C. *S. caespitosus* L.

DD. Involucre-bracts 2—3 times as long as the spikelet. C. E. *S. subterminalis* Torr.

AA. Spikelets more than 1 except sometimes in dwarfed plants.

F. Stem terete.

G. Spikelets sessile or nearly so, in a crowded head-like cluster. E. *S. nevadensis* Wats.

GG. Spikelets stalked, in loose umbel-like clusters.

H. Akene 2 mm. long; scales of the spikelets barely longer than the akenes. E. (*S. lacustris*, mostly.)

S. validus Vahl.

HH. Akene 2.5—3 mm. long; scales of the spikelets $\frac{1}{4}$ longer than the akenes. W. C. E. *S. occidentalis* Chase (Tule)

- FF. Stem 3-angled.
- I. Spikelets sessile or very nearly so, in a dense head-like cluster.
- J. Involucre-leaf 1.
- K. Leaves mere sheathing bracts; involucre-leaf 1—3 cm. long; spikelets obtuse; spikelet-scales not 2-cleft. E.
S. olneyi Gray
- KK. Leaves 1—3, well developed; involucre-leaf 4—15 cm. long; spikelets blunt; spikelet-scales 2-cleft. W. E.
S. americanus Pers.
- JJ. Involucre-leaves 2 or more.
- L. Involucre-bracts scale-like, 4—8 mm. long; spikelets 6—8 mm. long. U.
S. criniger Gray
- LL. Involucre-bracts leaf-like, at least one of them 1—4 dm. long; spikelets 15—30 mm. long.
- M. Scales of the spikelet whitish to brownish. E. (*S. brittonianus*).
S. campestris Brit.
- MM. Scales of the spikelet reddish by numerous elongated red markings. W. *S. robustus* Pursh
- II. Spikelets or some of them plainly stalked, in a loose umbel-like cluster.
- N. Spikelets 10—20 mm. long, their scales awned. W.
S. robustus Pursh
- NN. Spikelets 3—10 mm. long, their scales awnless.
- O. Spikelet mostly solitary at the ends of the umbel-rays; perianth-bristles smooth, 6. E. *S. lineatus* Michx.
- OO. Spikelets in dense clusters at the ends of the umbel-rays; perianth-bristles barbed, 4—6.
- P. Akenes 3-angled; perianth-bristles 6; styles 3. E.
S. atrovirens Willd.
- PP. Akenes plano-convex; perianth-bristles 4; styles 2. W. C. E.
S. microcarpus Presl.

ELEOCHARIS

SPIKE-RUSH

Annual or perennial, mostly with rootstocks; stem simple, 2—4-angled or terete. Leaves reduced to sheaths or the lowest rarely with a blade. Spikelets terminal, solitary, without involucre, scaly; scales convex, spirally imbricated. Perianth of 0—12 bristles; bristles usually retrorse-barbed. Stamens 2—3. Style 2-cleft, the base persistent and becoming a tubercle on the tip of the akene; tubercle often constricted where it joins the akene. Fruit an akene, 3-angled or lens-shaped. (Gk. *elos* = a marsh, *chairō* = to rejoice; because it grows in wet places.)

- A. Akene 3-angled; style 3-cleft.
- B. Akene smooth, its tubercle awl-shaped. E.
E. rostellata Torr.
- BB. Akene ribbed, its tubercle short and wide. W. C. E. (*E. acicularis bella*).
E. acicularis R. & S.
- AA. Akene biconvex; style 2-cleft.
- C. Tubercle of the akene constricted at base.
- D. Annual, tufted, without rootstocks.
- E. Mature akene black; upper leaf-sheath oblique at tip; tubercle of akene wider than high. C. E. *capitata* R. Br.

- EE. Mature akene pale-brown; upper leaf-sheath nearly truncate at tip; tubercle of akene higher than wide. W. E.
E. ovata R. & S.
- DD. Perennial, not tufted, with rootstocks; mature akene brown. W. E.
E. palustris R. & S.
- CC. Tubercle of the akene not constricted at base; annual.
- F. Perianth-bristles not longer than the akene; heads oblong. W. C. E. (*E. obtusa gigantea*.) *E. obtusa* Schu.
- FF. Perianth-bristles longer than the akene; heads ovoid. C. E. (*E. monticola laeviseta*.) *E. monticola* Fer.

STENOPHYLLUS

Annual; stem slender, erect. Leaves narrowly linear or filiform; leaf-sheath ciliate or pubescent (ours). Flowers perfect. Spikelets either solitary, or in umbels or heads, the whole subtended by a 1- to several-leaved involucre; scales spirally imbricated all around, mostly deciduous. Perianth none. Stamens 2—3 (2 in ours). Style 2—3-cleft (2 in ours), glabrous, much swollen at base and persistent on the akene as a tubercle. Akene lens-shaped or 3-angled (ours). In sandy fields. (Gk. *stenos*=narrow, *phyllon*=leaf; on account of the very narrow leaves.) U.

S. capillaris Brit. (Hair Sedge)

RHYNCHOSPORA

BEAK-RUSH

Leafy, mostly perennial by rootstocks; stems erect, terete or 3-angled. Leaves narrow, flat or rolled up. Spikelets ovoid or oblong or fusiform, variously clustered; scales thin, 1-veined, imbricated all around, usually mucronate by the excurrent mid-vein, the lower one empty. Upper flowers imperfect. Perianth of bristles, 1—20, mostly 6, upwardly or downwardly (ours) barbed or scabrous, wanting in some (not ours). Stamens commonly 3. Style 2-cleft or 2-toothed or rarely entire. Akene lens-shaped or swollen, not 3-angled, smooth or transversely wrinkled, capped by the persistent tubercle-like base of the style, or in some species by the whole style (not ours). In bogs. (Gk. *rynchos*=a snout, *spora*=a seed; referring to the long-beaked akene.) W.

R. alba Vahl (White Beak-rush)

CAREX

SEDGE

Perennial, grass-like; stem mostly 3-angled. Leaves 3-ranked, grass-like. Flowers in spikes, in the axils of scales, without perianth altho the akene is in a sac (perigynium) of united scales which might easily be mistaken for a perianth; spikes in the axils of leaf-like or scale-like bracts, often again clustered; staminate and pistillate flowers on different plants, or on the same plant but in different spikes, or in the same spike. Stamens 3. Pistil 1, enclosed by the perigynium; styles 2—3, exserted. Fruit an akene, 3-angled or lens-shaped. (Gk. *keirein*=to cut; referring to the sharp leaf-edge.) The keys apply to the mature fruiting condition.

A. Stigmas 3; akenes 3-angled; some of the spikes entirely pistillate.

EUCAREX (p. 79)

AA. Stigmas 2; akenes lens-shaped.

B. Some of the spikes entirely pistillate; spikes not all sessile. EUCAREX (p. 79)

BB. Spikes with staminate flowers above or below or among the pistillate flowers, usually all sessile.

VIGNEA (p. 85)

Subgenus EUCAREX—Pistillate spikes distinct or rarely again bunched into heads or panicles, mostly peduncled. Staminate spikes 1 or more, terminal, linear or club-shaped, often pistillate at base or apex, or rarely with some pistillate flowers intermixed. Stigmas 2—3. Akenes lens-shaped or 3-angled.

- A. Stigmas 3; akenes 3-angled.
 - B. Spike only 1, terminal. GROUP 1 (p. 79)
 - BB. Spikes more than 1.
 - C. Perigynia hairy. GROUP 2 (p. 80)
 - CC. Perigynia smooth.
 - D. Beak or opening of the perigynium plainly 2-toothed.
 - E. Scales of the spike rough-awned. GROUP 3 (p. 81)
 - EE. Scales of the spike awnless or smooth-awned. GROUP 4 (p. 81)
 - DD. Beak or opening of the perigynium entire, or slightly and bluntly notched, or split down 1 side. GROUP 5 (p. 82)
- AA. Stigmas 2; akenes lens-shaped.
 - F. Scales of the pistillate spikes green or yellowish, sometimes somewhat purple-margined. GROUP 6 (p. 83)
 - FF. Scales of the pistillate spikes brown or purple or black.
 - G. Scales of the pistillate spikes with mid-vein excurrent as an awn or mucro, or the scales very acute to acuminate. GROUP 7 (p. 83)
 - GG. Scales of the pistillate spikes without excurrent mid-vein, acute to rounded.
 - H. At least the lower pistillate spikes drooping; perigynia equaling or shorter than the scales (longer in *C. mertensii*.) GROUP 8 (p. 84)
 - HH. Pistillate spikes erect to merely spreading.
 - I. Perigynia equaling or exceeding the scales. GROUP 9 (p. 84)
 - II. Perigynia shorter than the scales. GROUP 10 (p. 85)

GROUP 1

- A. Perigynia scabrous or hairy.
 - B. Scales of the pistillate spike with tip ciliate-margined.
 - C. Perigynia about 2 mm. long, oval to obovate; scales dark-purple. W. C. E. *C. scirpoidea* Michx.
 - CC. Perigynia about 4 mm. long, lanceolate; scales black, C. E. *C. stenochlaena* Mack.
 - BB. Scales of the pistillate spike not ciliate-margined.
 - D. Spike bractless; perigynia broadly triangular-obovoid. E. *C. filifolia* Nutt.
 - DD. Spike bracted; perigynia lanceolate. C. *C. scabriuscula* Mack.
- AA. Perigynia smooth.
 - E. Perigynia lanceolate or spindle-shaped.
 - F. Perigynia 2—3 times as long as the scales, greenish. W. *C. pauciflora* Lft.
 - FF. Perigynia 1—1½ times as long as the scales, brown.
 - G. Perigynia shining; staminate flowers occupying 1/3 or less of the spike. W. C. *C. pyrenaica* Wahl.
 - GG. Perigynia dull; staminate flowers occupying about 1/2 of the spike. C. E. *C. nigricans* Mey.
 - EE. Perigynia ovate or elliptic or obovate.
 - H. Perigynia exceeding the scales of the spike.
 - I. Perigynia straw-colored; lower scales of the spike not foliaceous, little if at all exceeding the perigynia. C. *C. paddoensis* Suks.

- II. Perigynia green; lower scales of the spike foliaceous, much exceeding the perigynia.
 - J. Pistillate scales cuspidate. C. E.
C. *geyeri* Boott
 - JJ. Pistillate scales long-acuminate. U.
C. *multicaulis* Bail.
- HH. Perigynia shorter than the scales of the spike.
- K. Perigynia beakless, obtuse or emarginate at tip. W. C.
C. *leptalea* Wahl.
- KK. Perigynia beaked, beak entire.
 - L. Perigynium-beak oblique at tip.
 - M. Stems 5—15 cm. high; spike 12 mm. or less long; perigynia brown to purple. E. C. *obtusata* Lilj.
 - MM. Stems 12—45 cm. high; spike 12—24 mm. long; perigynia straw-colored. C. C. *breweri* Boott
 - LL. Perigynium-beak not oblique at tip. E.
C. *filifolia miser* Bail.

GROUP 2

- A. Pistillate spikes 18—50 mm. long; scales acute or acuminate or cuspidate; perigynia green or rusty-brown.
- B. Perigynia hairy on the angles only. W. C. E. (*C. frigida*).
C. *ablata* Bail.
- BB. Perigynia hairy thruout except on the beak.
 - C. Leaves rolled up, about 2 mm. wide; stem 6—9 dm. high, smooth. W. C. E.
C. *filiformis* L.
- CC. Leaves flat, wider.
 - D. Stem rough above, 3—8 dm. high. W. E.
C. *lanuginosa* Michx.
- DD. Stem smooth, 2—4 dm. high. C. E.
C. *oregonensis* Oln.
- AA. Pistillate spikes 4—18 mm. long (occasionally longer in *C. concinnoides* but in that the scales are obtuse or rounded); scales various at apex; perigynia various in color.
- E. Stem equaling or exceeding the leaves.
- F. Stem leafless between the basal tuft and the bracts of the inflorescence.
- G. Pistillate scales brown at least in the middle, sometimes scarious-margined.
- H. Spikes all sessile, even the staminate so; perigynia white or light-colored.
W. C. E. C. *verpertina* How.
- HH. Some of the spikes stalked, the staminate at least so; perigynia brown at base. C. C. *inops* Bail.
- GG. Pistillate scales green or whitish. (See EE.)
- FF. Stem with some leaves or leaf-like bracts between the basal tuft and the bracts of the inflorescence.
 - I. Perigynia loosely pubescent, wider and longer than the scales; staminate spike nearly sessile; pistillate spikes few-flowered. E.
C. *concinoides* Mack.
 - II. Perigynia appressed pubescent, narrower and shorter than the scales; staminate spike evidently stalked; pistillate spikes many-flowered. E.
C. *richardsonii* R. Br.
- EE. Stem exceeded by the leaves.

- J. Bases of the old leaves persisting as stiff tufted shreds; scales equaling or exceeding the perigynia, acute or acuminate.
- K. Perigynium-beak nearly as long as the body. C. E. (*C. globosa*; *C. deflexa farwellii*; *C. deflexa media*)
C. umbellata Schk.
- KK. Perigynium-beak about $1/3$ as long as the body. W. C. E. (*C. umbellata brachyrina*.) *C. umbellata brevirostris* Boott
- JJ. Bases of old leaves soft, slightly if at all shredded; scales shorter than the perigynia.
- L. Spikes in a head-like cluster; staminate spike minute, invisible in the head; pistillate scales obtuse or acute. C. E.
C. deflexa Hornm.
- LL. Spikes more scattered; staminate spike 6—12 mm. long, prominent; pistillate scales acuminate. W. C. E. (*C. rossii*.)
C. deflexa rossii Bail.

GROUP 3

- A. Pistillate scale with an awn 2—3 times as long as the body; perigynia thin, membranous or papery.
- B. Perigynia ascending; staminate spike slender-stalked. E.
C. hystricina Willd.
- BB. Perigynia reflexed; staminate spike short-stalked. W. E.
C. comosa Boott
- AA. Pistillate scale with an awn shorter than the body; perigynia firm, hard or leathery (except *C. ultriculata*).
- C. Lower pistillate spikes with peduncles 5—15 cm. long. C.
C. luzulaefolia Boott
- CC. Pistillate spikes all sessile, or the peduncles 1 cm. or less long.
- D. Leaves bright-green, not glaucous; teeth of perigynium-beak conspicuous, slender, spreading. E. C. *aristata* R. Br.
- DD. Leaves pale-green, glaucous; teeth of perigynium-beak inconspicuous, short, erect.
- E. Perigynia thin, membranous or papery, indistinctly veined. W. C. E.
C. utriculata Boott
- EE. Perigynia firm, hard or leathery, very distinctly veined. E.
C. riparia Curt.

GROUP 4

- A. Pistillate spikes 3—12 mm. long.
- B. Pistillate spikes sessile or nearly so.
- C. Perigynium-beak distinctly shorter than the body.
- D. Leaves 1—3 mm. wide. C. (*C. viridula*.)
C. oederi pumila Fer.
- DD. Leaves 6—12 mm. wide. E.
C. owyheensis Nels.
- CC. Perigynium-beak about as long as the body. W. E.
C. flava rectirestra Gaud.
- BB. Pistillate spikes long-peduncled.
- E. Leaves smooth; spikes erect; perigynia scarcely rostrate, exceeded by the scales. W. C.
C. spectabilis Dew.
- EE. Leaves roughish; spikes drooping; perigynia plainly rostrate, exceeding the scales. E.
C. capillaris L.

- AA. Pistillate spikes 15 mm. or more long.
- F. Perigynia straw-colored or purple.
 - G. Perigynia 3—5 times as long as the scales. W. C. E. (*C. exsiccata*; *C. exsiccata globosa*.) *C. mirata* Dew.
 - GG. Perigynia less than twice as long as the scales.
 - H. Pistillate spikes 1—3 cm. long; perigynium-beak as long as the body. *C. luzulaefolia* Boott
 - HH. Pistillate spikes 2.5—15 cm. long; perigynium-beak about $\frac{1}{2}$ as long as the body.
 - I. Leaves 4—14 mm. wide; stem stout; perigynia not conspicuously turgid, squarrose. W. C. E. *C. utriculata* Boott
 - II. Leaves 2—5 mm. wide; stem slender; perigynia conspicuously turgid, ascending.
 - J. Perigynia straw-colored. C. E. (*C. monile pacifica*.) *C. monile* Tuck.
 - JJ. Perigynia dark-brown. E. *C. monile colorata* Bail.
 - FF. Perigynia green or yellow-green.
 - K. Perigynia hairy on the angles. W. C. E. (*C. frigida* of How. Fl.) *C. ablata* Bail.
 - KK. Perigynia smooth.
 - L. Perigynia 2—3 times as long as the scales, reflexed. E. *C. retrorsa* Schw.
 - LL. Perigynia less than twice as long as the scales, erect or ascending.
 - M. Stem equaling or exceeded by the leaves; staminate spikes 2—4; pistillate scales somewhat purplish. C. *C. rostrata* Stokes
 - MM. Stem exceeding the leaves; staminate spike only 1; pistillate scales cinnamon-colored with green middle. U. *C. cinnamomea* Oln.

GROUP 5

- A. Pistillate scales awned.
 - B. Perigynia short-beaked, granulate; pistillate spikes 2.5—10 cm. long, erect, sessile or very short-stalked; terminal spike entirely staminate. W. C. E. *C. amplifolia* Boott
 - BB. Perigynia beakless; pistillate spikes 0.8—2 cm. long.
 - C. Terminal spike staminate at base only; pistillate spikes erect, sessile or very short-stalked; perigynia not granulate, rough on the edges above. C. *C. fusca* All.
 - CC. Terminal spike entirely staminate; pistillate spikes drooping, long-stalked; perigynia granulate, not rough on the edges. W. C. E. *C. limosa* L.
 - AA. Pistillate scales awnless.
 - D. Pistillate spikes 12—25 mm. long.
 - E. Pistillate scales acute, black; perigynia obovoid, beaked; leaves glaucous. E. *C. reynoldsii* Dew.
 - EE. Pistillate scales obtuse or rounded, brown or yellow; perigynia elliptic or ovate.
 - F. Leaves glaucous; perigynia beakless; pistillate scales entire. C. *C. livida* Willd.

- FF. Leaves not glaucous; perigynia plainly beaked; pistillate scales often erose at tip. C. *C. polymorpha* Muhl.
- DD. Pistillate spikes 8—12 mm. long.
- G. Pistillate scales light-colored. W. E.
C. hendersoni Bail.
- GG. Pistillate scales black, white-veined.
- H. Perigynia smooth, straw-colored, very short-beaked. C. E.
C. heteroneura Boott
- HH. Perigynia granular, brownish or green, beakless.
- I. Perigynia brownish; stem exceeding the leaves. C.
C. stylosa Mey.
- II. Perigynia green; stem exceeded by the leaves. C. (*C. spreta*.)
C. accedens Holm

GROUP 6

- A. Pistillate scales green or black or purple.
- B. Perigynia granulate, faintly veined; pistillate spikes 8—25 mm. long. W. E.
C. lenticularis Michx.
- BB. Perigynia smooth.
- C. Perigynia veinless or faintly veined.
- D. Pistillate spikes 0.4—1 cm. long. C. E.
C. alpina Sw.
- DD. Pistillate spikes 1—6 cm. long.
- E. Plant robust; most of the bracts exceeding the stem; pistillate scales acute. E. *C. aquatilis* Willd.
- EE. Plant slender; only the lower bract if any exceeding the stem; pistillate scales obtuse.
- F. Leaves somewhat revolute when dry; lower spikes short-stalked. C.
E. (*C. acutina tenuior*.)
C. acutina Bail.
- FF. Leaves somewhat involute when dry; lower spikes long-stalked. W.
C. E. (*C. tolmiei* and varieties.)
C. scopulorum Holm
- CC. Perigynia strongly veined; pistillate spikes 8—30 mm. long. E. (*C. nebraskensis ultriformis*.) *C. nebraskensis* Dew.
- AA. Pistillate scales yellowish.
- G. Perigynia shorter than the scales; pistillate scales acuminate. W. E.
C. bovina How.
- GG. Perigynia equaling or longer than the scales; pistillate scales acute or cuspidate or short-awned. W. C. E. (*C. aurea celsa*.)
C. aurea Nutt.

GROUP 7

- A. Perigynia granulate or papillose, the margins not serrulate.
- B. Pistillate spikes 3—5 cm. long; pistillate scales dark-purple; perigynium-beak emarginate; perigynia green or purple-spotted. C. E.
C. pachystoma Holm
- BB. Pistillate spikes 0.5—1.5 cm. long.
- C. Pistillate scales dark-purple; perigynium-beak entire; perigynia brown. W.
C. decidua Boott
- CC. Pistillate scales black; perigynium-beak emarginate; perigynia brownish-green with purple spots. E.
C. prionophylla Holm

- AA. Perigynia smooth but the margins above serrulate. U.
C. laciniata Boott
- AAA. Perigynia smooth thruout.
- D. Perigynia longer than the scales.
- E. Pistillate scales rough-awned. C.
C. gmelini Hook.
- EE. Pistillate scales awnless or merely mucronate.
- F. Bracts about equaling the stem; pistillate scales brown. E. (*C. nebraskensis ultriformis*.)
C. nebraskensis Dew.
- FF. Bracts short; pistillate scales purple-black. C. (*C. invis*.)
C. spectabilis Bail.
- DD. Perigynia $1/3$ — $1/2$ as long as the scales.
- G. Pistillate spikes sessile or nearly so, erect. C. E.
C. aperta Boott
- GG. Pistillate spikes long-stalked, drooping.
- H. Leaves pale-green, withering at the first frost; staminate spike stalked; perigynia light-colored. W.
C. cryptocarpa Mey.
- HH. Leaves very dark-green, persistent thruout the winter; staminate spike sessile; perigynia purple-brown. W. C. (*C. sitchensis* Hook.)
C. magnifica Dew.

GROUP 8

- A. Pistillate spikes rounded to oval.
- B. Pistillate spikes 5—12 mm. long. C. E.
C. alpina Sw.
- BB. Pistillate spikes 12—40 mm. long. C. E. (*C. chalciolepis*; *C. atrata nigra*.)
C. atrata L.
- AA. Pistillate spikes oblong to long-cylindric.
- C. Perigynia much longer than the scales. W. C. E.
C. mertensii Pers.
- CC. Perigynia equaling or shorter than the scales.
- D. Scales purple, without white center. W. C. E. (*C. tolmiei* and varieties.)
C. scorpulorum Holm
- DD. Scales brown, sometimes purplish but then with white center.
- E. Scales with white center; perigynia smooth.
- F. Scales acute or rough-awned. U.
C. laciniata Boott
- FF. Scales obtuse or rounded. U. C.
C. barbarae Dew.
- EE. Scales without white center; perigynia granulate, often rough-angled.
W. C. (*C. howellii*.)
C. dives Bail.

GROUP 9

- A. Pistillate scales brown or green.
- B. Lower leaf-sheaths prominently fibrillose. W. E.
C. stricta Lam.
- BB. Leaf-sheaths not fibrillose.
- C. Spikes densely-flowered thruout, the lower short-stalked; perigynium-beak 2-toothed. E. (*C. nebraskensis ultriformis*.)
C. nebraskensis Dew.

- CC. Lowest spikes loosely-flowered at base; perigynium-beak entire or barely emarginate.
 D. Lower spike long-stalked. C.
 C. nudata anomala Bail.
 DD. Lower spike short-stalked. W. C. E.
 C. interrupta Boeck.
 AA. Pistillate scales purple.
 E. Leaves 2—4 mm. wide; pistillate spikes about 2 mm. thick; scales obtuse. W. C. E.
 C. kelloggii Boott
 EE. Leaves 6—8 mm. wide; pistillate spikes 6—8 mm. thick; scales acute or acuminate. C. E.
 C. reynoldsii Dew.
 AAA. Pistillate scales black.
 F. Perigynia granulate, yellowish-green; pistillate spikes about 2. W. C. E.
 C. gymnoclada Holm
 FF. Perigynia smooth, almost white; pistillate spikes about 4. E. (*C. hallii*).
 C. pulchella Holm

GROUP 10

- A. Pistillate spikes globose to oval.
 B. Terminal spikes staminate below only; pistillate scales black. C. E.
 C. alpina Sw.
 BB. Terminal spike entirely staminate; pistillate scales dark-purple. E.
 C. bigelovii Torr.
 AA. Pistillate spikes oblong or longer.
 C. Pistillate scales black, obtuse; perigynia green or whitish thruout. E.
 C. variabilis Bail.
 CC. Pistillate scales dark-purple, obtuse or acute; perigynia purplish above.
 D. Stem scabrous; pistillate spikes 2—3 mm. thick; pistillate scales obtuse.
 C. E. (*C. nudata versuta*; *C. nudata angustifolia*).
 C. nudata Boott
 DD. Stem usually smooth; pistillate spikes 4—6 mm. thick; pistillate scales acute.
 C. E. (*C. rigida hesperia*).
 C. rigida Good.

Subgenus VIGNEA—Pistillate spikes usually more or less bunched into heads or even panicles. Spikes mostly uniform and sessile, bearing staminate flowers at base or apex or among the pistillate ones. Stigmas 2. Cross-section of perigynium plano-convex. Akene lens-shaped.

- A. Staminate flowers borne at the top of the spikes.
 B. Spikes densely packed so the individual ones are hardly discernible, or spike only
 1. GROUP 11 (p. 86)
 BB. Spikes more loosely packed so the individual ones are easily discernible but touching or nearly so. GROUP 12 (p. 86)
 BBB. At least the lower spikes separated by 5 mm. or more of space.
 GROUP 13 (p. 87)
 AA. Staminate flowers borne at the base of the spikes or scattered among the pistillate flowers.
 C. Spikes all aggregated into an uninterrupted head. GROUP 14 (p. 87)
 CC. At least the lowest spikes separated by 5 mm. or more of space.
 GROUP 15 (p. 88)

GROUP 11

- A. Perigynia smooth.
- B. Stem smooth. C. (*C. foetida*)
C. *vernacula* Bail.
- BB. Stem scabrous. E. C. *nervina* Bail.
- AA. Perigynia rough at least on the angles or on the beak.
- C. Spike only 1. C. C. *nardina* Fries
- CC. Spikes several to many, in a somewhat head-like cluster.
- D. Perigynia nearly orbicular, chestnut-brown, exceeded by the scale.
- E. Stems 1—2 dm. high; heads 8—18 mm. long, ovate, little exceeding the leaves; pistillate scales acuminate. E.
C. *gayana* Desv.
- EE. Stems 3—4 dm. high; heads 12—25 mm. long, linear-oblong to ovate-oblong, much exceeding the leaves; pistillate scales cuspidate. E.
C. *simulata* Mack.
- DD. Perigynia ovate or lanceolate, various in color and length.
- F. Inflorescence spike-like, oblong or cylindric.
- G. Inflorescence 1.5—2 cm. long; scales much shorter than the perigynia.
E. C. *brevisquama* Mack.
- GG. Inflorescence 2—3.5 cm. long; scales about equaling the perigynia.
- H. Bracts all shorter than their spikes; inflorescence uninterrupted; pistillate scales blunt. E.
C. *occidentalis* Bail.
- HH. At least the lower bracts exceeding their spikes; inflorescence often interrupted; pistillate scales acute or mucronate. E.
C. *hookeriana* Dew.
- FF. Inflorescence head-like, ovoid or ovate to oblong; lower bracts exceeding their spikes.
- I. Plant 1—3 dm. high; head 2.5—7.5 cm. long, 2.5—3.75 cm. thick; seashore plant. W.
C. *macrocephala* Willd.
- II. Plant 3—9 dm. high; head 1—2 cm. long, 1—2.5 cm. thick; not a seashore plant. W. C. E. (*C. hoodii neurocarpa*; *C. hoodii nervosa*.)
C. *hoodii* Boott

GROUP 12

- A. Spikes green.
- B. Perigynia ovate to lanceolate, beak 2-toothed. W. C. E. (*C. sterilis* for our region.)
C. *stellulata* Good.
- BB. Perigynia obovate, beak entire and oblique. E.
C. *vallicola* Dew.
- AA. Spikes light-yellow to brown.
- C. Spikes nearly linear, light-colored.
- D. Scales obtuse to rounded, about equaling the perigynia. E.
C. *occidentalis* Bail.
- DD. Scales acute to acuminate or cuspidate, much longer than the perigynia.
- E. Spikes rather crowded; perigynia smooth. E.
C. *douglasii* Boott
- EE. Spikes rather loose; perigynia rough-margined. E.
C. *irrasa* Bail.
- CC. Spikes ovoid to oblong, light- to dark-brown or blackish.

- F. Perigynia shorter than the scales. W.
C. pansa Bail.
- FF. Perigynia equaling or exceeding the scales.
 G. Perigynia 2—3 times as long as the scales, rough-beaked; perigynium-beak 1—2 times as long as the body. W. C. E.
C. stipata Muhl.
- GG. Perigynia 1—1½ times as long as the scales, rough on the ridges above; perigynium-beak long or short.
 H. Bracts small or none.
 I. Inflorescence dense, spike-like, dark-brown. E. (*C. diandra*.)
C. teretiuscula Good.
- II. Inflorescence loose, somewhat panicle-like, light-brown. W. C. E.
 (*C. teretiuscula ampla*; *C. diandra ramosa*.)
C. teretiuscula prairie Brit.
- HH. Bracts setaceous, exceeding the spikes. W. (*C. vicaria costata*.)
C. vicaria Bail.

GROUP 13

- A. Spikes greenish; pistillate scales white, equaling or shorter than the perigynia. E.
C. tenella Schk.
- AA. Spikes yellow or brown; pistillate scales various in color and length.
 B. Bracts longer than their spikes; pistillate scales acute or cuspidate.
 C. Scales shorter than the perigynia, ovate; heads 1—4 cm. long; perigynia rough on the ridges above. W. (*C. vicaria costata*.)
C. vicaria Bail.
- CC. Scales equaling the perigynia, lanceolate; heads 4—12 cm. long; perigynia smooth. E.
C. vulpinoidea Michx.
- BB. Bracts shorter than their spikes or occasionally the lower one a little longer.
 D. Scales shorter than the perigynia, blunt or obtuse. C.
C. jonesii Bail.
- DD. Scales equaling or exceeding the perigynia.
 E. Pistillate scales acute or cuspidate; perigynia rough on the ridges above. E.
 (*C. marcida debilis*.)
C. marcida Boott
- EE. Pistillate scales blunt or obtuse; perigynia hairy on the ridges above. E.
C. usta Bail.

GROUP 14

- A. Bracts subtending the head leaf-like, 2 or more times as long as the head. C. E.
C. athrostachya Oln.
- AA. Bracts subtending the head often scale-like, not exceeding the head.
 B. Perigynia not wing-margined, rough above. W. C. E. (*C. canescens ore-gana*.)
C. arcta Boott
- BB. Perigynia wing-margined.
 C. Spikes in an oval or roundish head; perigynia rough on the ridges above.
 D. Perigynia about as long as wide. E.
C. festuacea brevior Fer.
- DD. Perigynia about twice as long as wide.
 E. Stem roughish above; pistillate scales blunt or acute. C.
C. specifica Bail.
- EE. Stem smooth; pistillate scales acuminate or cuspidate. W.
C. scoparia Schk.

- CC. Spikes in an elongated spike-like cluster.
- F. Perigynia lanceolate.
- G. Plant 1—2 dm. high; perigynia equaling the scales. E.
C. tenuirostris Oln.
- GG. Plant 2—8 dm. high; perigynia either longer or shorter than the scales.
- H. Perigynia shorter than the scales, pale-brown. W. C. E.
C. feta Bail.
- HH. Perigynia exceeding the scales.
- I. Perigynia dull-brown; heads 1—2 cm. long. E.
C. bebbii Oln.
- II. Perigynia greenish; heads 2.5—4 cm. long. W. C. E. (*C. festiva gracilis*.)
C. multinoda Bail.
- FF. Perigynia ovate.
- J. Heads 5—12 mm. long; perigynia narrowly winged. W. C. E.
C. illota Bail.
- JJ. Heads 12—30 mm. long; perigynia broadly winged.
- K. Leaves 2—4 mm. wide; perigynium-beak 2-toothed; perigynia serrulate on the wings. C.
C. straminiformis Bail.
- KK. Leaves 4—6 mm. wide; perigynium-beak entire, oblique; perigynia serrulate on the beak only. W. C. E. (*C. festiva horneri*; *C. festiva stricta*; *C. festiva pachystachya*.)
C. festiva Dew.

GROUP 15

- A. Perigynia not wing-margined.
- B. Pistillate scales obtuse. W. C. E. (*C. festiva horneri*; *C. festiva stricta*; *C. festiva pachystachya*.) *C. festiva* Dew.
- BB. Pistillate scales acute.
- C. Plant markedly stoloniferous; stems more or less in rows from elongated root-stocks. C. *C. siccata* Dew.
- CC. Plant not markedly stoloniferous; stems solitary or in tufts.
- D. Perigynia 8—12 mm. long. E.
C. liddoni Boott
- DD. Perigynia 4—5 mm. long.
- E. Spikes silvery-brown; top of the stem inclined to nod. W. C. E. (*C. furva*.) *C. pratensis* Drej.
- EE. Spikes dark-brown; top of the stem stiff, erect.
- F. Leaves bunched near the base, somewhat involute. W. C. E.
C. phaeocephala Pip.
- FF. Leaves not bunched, flat. W. E. (*C. petasata*.)
C. leporina L.
- AA. Perigynia wing-margined.
- G. Perigynia more than 4 mm. long.
- H. Scales acute or acuminate, sometimes cuspidate, not hispid.
- I. Spikes quite distant; stem slender; leaves about equaling the stem. W. C. E.
C. laeviculmis Mein.
- II. Spikes rather near; stem rather stout; leaves shorter than the stem. E.
C. deweyana Schw.
- HH. Scales hispid-awned. W. C. E. (*C. deweyana bolanderi*.)
C. bolanderi Oln.

- GG. Perigynia less than 4 mm. long.
 J. Perigynia horizontal or reflexed, ovate, 3—4 mm. long.
 K. Spikes 5—12-flowered.
 L. Inflorescence 1—3 cm. long; spikes 2—6, somewhat near. W. C. E.
 (C. *sterilis* for our region.)
 C. *stellulata* Good.
 LL. Inflorescence 2—6 cm. long; spikes 2—4, very remote. C.
 C. *stellulata ormantha* Fer.
 KK. Spikes 12—20-flowered. W.
 C. *stellulata excelsior* Fer.
 JJ. Perigynia ascending to erect, elliptic to ovoid-oblong, 2—3 mm. long.
 M. Plant glaucous; leaves 2—4 mm. wide; perigynia many, glaucous, obscurely beaked. W. C. (C. *canescens subloliacea*).
 C. *canescens* L.
 MM. Plant not glaucous; leaves 1—2.5 mm. wide; perigynia few, not glaucous, distinctly beaked. C.
 C. *brunescens* Poir.

ARACEAE

Arum Family

Herbs, large, perennial, with acrid or pungent juice. Leaves large, all basal (ours) or alternate, simple (ours) or compound, often quite netted-veined. Flowers crowded on a *spadix* which is usually surrounded by a conspicuous *spathe* (ours). Perianth none, or of 4—6 sepals (ours). Stamens 4 (ours). Ovary 1- to several-celled; ovules 1 to several in each cell; style short or none; stigma terminal, mostly minute and sessile. Fruit usually berry-like. Seed various, mostly minute.

LYSICHITON

SKUNK CABBAGE

Plant with strong skunk-like smell; rootstock very thick, horizontal. Leaves flat, netted but the large veins from the base, 3—12 dm. long, 7—45 cm. wide. Spathe yellow; spadix 5—10 cm. long, 2—3.5 cm. wide. Flowers numerous. Petals none. Sepals 4. Stamens opposite the sepals; filaments short, flat. Ovary conical, 2-celled, 2-ovuled; stigmas depressed. (Gk. *lysis*=a loosening, *chiton*=a mantle; referring to the yellow spathe.) W. C. E.

L. *camtschatcense* Scott (Skunk Cabbage)

LEMNACEAE

Duck-weed Family

Minute, stemless, floating, merely 1 or more flattened (ours) or spherical multicellular green bodies with (ours) or without roots hanging from the under side. Flowers monoicous, 1 or more from the edge, rarely present. Fruit a *utricle*. Seeds 1—7, large.

A. Thalloid shoots 1—5-veined, with 0—1 rootlet. LEMNA (p. 89)

AA. Thalloid shoots 7—15-veined, with several rootlets. SPIRODELIA (p. 90)

LEMNA

DUCK-WEED

Thalloid shoots with numerous acicular raphides; new shoots coming from a lateral slit; roots without vascular tissue. Flowers from lateral slits, usually 3 together, surrounded by a spathe, 2 staminate, 1 pistillate. Anther-cells transverse. Seeds 1—6. Floating on fresh-water ponds or lakes. (Gk. *limne*=swamp; referring to the habitat.)

A. Thalloid shoots long-stalked at base, oblong, 6—10 mm. long, remaining connected. W. E.
 L. *trisulca* L. (Fairy Paddle)

- AA. Thalloid shoots sessile, elliptic-oblong, 2.5—4 mm. long, soon separating. W.
 E. *L. minor* L. (Small Duck-weed)

SPIRODELIA

Thalloid shoots round-obovate, purplish beneath, 3—8 mm. long, each with a cluster of 2—10 rootlets. Roots with central vascular cylinder. Anther-cells vertical. Seeds 2. (Gk. *speira*=a cord, *delos*=evident; from the thread-like roots.) W. E.
S. polyrhiza Schl. (Large Duck-weed)

PONTEDERIACEAE Pickerel-weed Family

Herbs. *Leaves grass-like* (ours) or petioled. *Flowers* solitary (ours) or in spikes, subtended by a leaf-like spathe, perfect, mostly irregular. Perianth free from the ovary, corolla-like, 6-parted. Stamens 3 (ours) or 6, mostly equal (not in ours), inserted on the tube (ours) or base of the perianth; filaments filiform; anthers introrse. Ovary 3-celled with the placentae in the axis, or 1-celled with 3 parietal placentae; style 1, filiform or columnar; stigma entire or minutely toothed. Fruit a many-seeded capsule (ours), or a 1-seeded utricle. *In water or bogs.*

HETERANTHERA

MUD-PLANTAIN

Low; stems creeping or ascending or floating. Flowers small, yellow (ours) or white or blue. Perianth-lobes equal or nearly so, linear; tube thread-like (ours). Ovary fusiform; stigma 3-lobed. Capsule ovoid, enclosed in the perianth-tube. (Gk. *hetera*=different, *anthera*=anther; ours and some other species have 2 forms of anthers.)
 E. *H. dubia* MacM.

JUNCACEAE

Rush Family

Annual or perennial, *grass-like or rush-like*. Inflorescence usually compound, panicle-like or umbel-like or even head-like, rarely a single flower. Flowers small, regular, hypogynous, persistent, with or without bractlets. *Sepals* 3, *glumaceous*. *Petals* 3, *similar to the sepals*. Stamens 6 or rarely 3; anthers 2-celled, introrse. Pistil 3-carpous, either 1-celled with 3 parietal placentae, or 3-celled; *ovary superior*; stigmas 3, filiform. Fruit a loculicidal capsule, 3-valved. Seeds 3—many, small.

- A. Leaf-sheaths open; leaves never hairy, mostly not flat nor grass-like; capsule 1-celled or 3-celled, many-seeded; placentae parietal or axial. JUNCUS (p. 90)
 AA. Leaf-sheaths closed; leaves often with few large hairs, flat, grass-like; capsule 1-celled, 3-seeded; placenta basal. JUNCOIDES (p. 93)

JUNCUS

RUSH

Plants glabrous, annual or perennial. Stem pithy or hollow, simple or rarely branching, terete or angular, leafless or leafy. Leaves terete or channeled or flat, sometimes equitant, often with cross-partitions in them. Flowers solitary, or in cymes or panicles or heads, greenish or brownish. Stamens 6, or 3 opposite the sepals. Capsule 3-celled, or 1-celled by the placentae not reaching the axis. *In water or wet soil.* (L. *jungere*=to bind; some species were twisted together for ropes.)

- A. Involucre leaf appearing like a continuation of the stem, erect, terete, not conspicuously channeled, the inflorescence therefore appearing lateral.

B. Plants usually over 25 cm. high, the smallest species reaching 60 cm., not characteristically alpine, some species caespitose; flowers in compound panicles, usually numerous; stamens 3 or 6.

- C. Involucral leaf at least $1/3$ shorter than the stem; stamens 3 or 6.
- D. Plants densely tufted from bunched rootstocks.
- E. Stamens 3; perianth 2 mm. long; capsule clavate-obovate, retuse or obtuse, not apiculate.
- F. Perianth-segments green when young; inflorescence a loose panicle. W.
J. effusus L. (Hummock Rush)
- FF. Perianth-segments brown; inflorescence a dense panicle. W. E.
(*J. effusus bruneus*.)
J. effusus hesperius Pip.
- EE. Stamens 6; perianth 3 mm. long; capsule subglobose, obtuse, apiculate.
C. E. *J. patens* Mey.
- DD. Plants rather in lines along elongated rootstocks; stamens 6; ripe capsule acute to obtuse, with sharp point.
- G. Mature capsule sharply triangular; sheaths at stem-base black. W. C.
J. lescurii Bol.
- GG. Mature capsule bluntly triangular; sheaths at stem-base tinged with green or brown. W. C. E.
J. balticus Willd. (Baltic Rush)
- CC. Involucral leaf about equaling the stem or longer; stamens 6. C. E.
J. filiformis L. (Thread Rush)
- BB. Plants 25 cm. or less high, alpine, caespitose; flowers 1—3; stamens 6.
- H. Inner leaf-sheaths at stem-base bristle-tipped; capsule acute. W. C. E. (*J. drummondii*.)
J. subtriflorus Cov.
- HH. Inner leaf-sheaths at stem-base leaf-bearing; capsule retuse. W. C. E.
J. parryi Engelm.
- AA. Involucral leaf not appearing like a continuation of the stem, or if so conspicuously channeled on the upper side, inflorescence usually appearing terminal.
- I. Leaves without cross partitions; either flat and with the flat side to the stem, or somewhat terete or hair-like and grooved.
- J. Stems either branched or less than 10 cm. long, leafy if long enough; annuals, bases soft, roots fibrous.
- K. Stamens 6; stems 2.5—30 cm. long, usually branched, leafy, with peduncles from the leaf axes.
- L. Capsule oblong. W. E.
J. bufonius L. (Toad Rush)
- LL. Capsule globose. E.
J. sphaerocarpus Nees
- KK. Stamens 3; stems none or very short, with several scape-like peduncles 2.5—7.5 cm. long.
- M. Inflorescence 3—7-flowered; bracts several; style exserted. W.
J. triformis Engelm.
- MM. Inflorescence 1—3-flowered; bracts 2 or more; style and stigma included. E. (*J. brachystylis*.)
J. triformis brachystylis Engelm.
- MMM. Inflorescence 1-flowered; bract 1; style exserted. E. (*J. uncialis*.)
J. triformis uniflorus Engelm.
- JJ. Stem mostly simple, naked or leafy; perennial, bases tougher, roots less fibrous.
- N. Flowers bracteolate, in a loose close panicle, but not in true heads.
- O. Capsule 1-celled; perianth-segments acuminate; panicles various.

- P. Panicle loose and wide-spreading when fully out; perianth and capsule pale-green. W. C. E.
J. tenuis Willd. (Yard Rush)
- PP. Panicle glomerate or nearly so; perianth and capsule grayish brown. W. C. E.
J. occidentalis Weig.
- OO. Capsule 3-celled; perianth-segments acute; panicle close, a turbinate cluster about 2.5 cm. long. E.
J. confusus Cov.
- NN. Flowers not bracteolate, in true heads.
- Q. Leaf-sheath with auricles; perianth smooth. E.
J. longistylis Torr.
- QQ. Leaf-sheath without auricles; perianth minutely roughened.
- R. Perianth longer than the capsule.
- S. Seed not tailed.
- T. Flowers in 1 or rarely 2—3 large heads. W.
J. falcatus Mey.
- TT. Flowers in 3—20 small heads. C. E. (*J. latifolius*).
J. orthophyllus Cov.
- SS. Seed tailed. C. E.
J. regelii Buch.
- RR. Perianth shorter than the capsule. W. C.
J. covillei Pip.
- II. Leaves with cross partitions; either flat and with the edge to the stem, or somewhat terete; sometimes channeled.
- U. Leaf-blade terete or only slightly compressed, sometimes channeled.
- V. Capsule subulate.
- W. Leaf-blades erect; flowers 3—4 mm. long, reddish-brown; petals equaling or exceeding the sepals. E.
J. nodosus L. (Knot Rush)
- WW. Leaf-blades spreading; flowers 4—5 mm. long, greenish or dull-brown; petals much shorter than the sepals. W. C. E.
J. torreyi Cov.
- VV. Capsule not subulate, wider for its length.
- X. Capsule when mature at least $1\frac{1}{2}$ times as long as the calyx. W. C. E. (*Apparently J. oreganus*).
J. castaneus Sm. (Chestnut Rush)
- XX. Capsule very little longer than the calyx, or shorter.
- Y. Stamens 3.
- Z. Capsule about as long as the perianth; filaments very little longer than the anthers; seeds acute at both ends. W. C. E.
J. acuminatus Michx. (Pointed Rush)
- ZZ. Capsule shorter than the perianth; filaments several times as long as the anthers; seeds acute at base only. U.
J. bolanderi Engelm.
- YY. Stamens 6.
- a. Capsule obtuse or retuse. E.
J. brachyphyllus Weig.
- aa. Capsule acuminate.
- b. Perianth-segments acute or obtuse; filaments much longer than the anthers; capsule longer than the perianth, acute or obtuse; seed

acute or acuminate at base only. W. C. E.

J. richardsonianus R. & S.

bb. Perianth-segments acuminate; filaments much shorter than the anthers; capsule shorter than the perianth, acuminate; seed acute or acuminate at both ends. U.

J. dubius Engelm.

aaa. Capsule abruptly acute.

c. Perianth pale-brown; seed with 20—26 ridges. E.

J. columbianus Cov.

cc. Perianth dark-brown; seed with about 15 ridges.

d. Capsule shorter than the perianth. C. E.

J. suksdorfii Rydb.

dd. Capsule equaling the perianth. C. E.

J. badius Suks.

ddd. Capsule longer than the perianth. C. E.

J. nevadensis Wats.

UU. Leaf-blade strongly flattened, equitant.

e. Leaves 2 mm. or less wide, with ligules; stem flattened but hardly 2-edged, slender. W. C. E. (*J. mertensianus filifolius*.)

J. mertensianus Bong.

ee. Leaves 2—6 mm. wide, with or without ligules; stem flat, 2-edged, stout.

f. Leaves with ligules; heads pale; capsule attenuate. W.

J. oxymeris Engelm.

ff. Leaves without ligules; heads brown or black; capsule acute.

g. Heads 2—several, nearly black. W. C. E. (Partly *J. xiphoides* of How. Fl.) *J. ensifolius* Wks. (Sword Rush)

gg. Heads many, brown. W. E. (Partly *J. xiphoides* of How. Fl.)

J. ensifolius major Hook.

JUNCOIDES (*Luzula*)

WOOD-RUSH

Perennial. Stems hollow, simple. Leaves grass-like, flat, soft, usually with some spider-web-like hairs. Flowers small, in loose involucrate umbels or panicles or spikes. Stamens 6. Capsule 1-celled. Seeds 3. Plants of drier soil, not in bogs. (*Juncus*, +Gk. *eidos*=like.)

A. Inflorescence an open panicle in which the flowers are in an open panicle or in clusters of 2—3.

B. Panicle drooping.

C. Perianth 1.5—2.5 mm. long, brown or green.

D. Leaves 4—8 mm. wide; seed with conspicuous hooked appendage at summit. E. (*J. pilosum* for our region.)

J. saltuense (Fer.)

DD. Leaves 10—12 mm. wide; seed without appendage. C. E. (Partly *J. spadeceum* of How. Fl.)

J. glabratum Sheld.

CC. Perianth 3—4.5 mm. long, brown.

E. Perianth and capsule dark-brown; leaves thick, dull; seeds yellow, constricted at each end. C. E.

J. piperi Cov.

EE. Perianth and capsule pale-green; leaves thin, shining; seeds brown, ellipsoid. W. C. E. *J. parviflorum* Cov.

BB. Panicle not drooping. C.

J. divaricatum Cov.

- AA. Inflorescence crowded into 1—several spike-like or head-like clusters.
 F. Flower-clusters sessile; inflorescence spike-like. C. E.
J. spicatum Kuntze (Spiked Wood-rush)
 FF. Flower-clusters mostly stalked; inflorescence umbel-like. W. C. E. (*J. comosum* of How. Fl.; *J. intermedium*).
J. campestre Kuntze (Field Wood-rush)

KEY DIRECT TO THE GENERA OF
 MELANTHACEAE, LILIACEAE, AND CONVALLARIACEAE

- A. Leaves not grass-like, either wider or mere scales.
 B. Leaves mere scales; plants very much branched, ultimate branchlets thread-like.
 ASPARAGUS (p. 107)
 BB. Leaves not scales; branching not profuse; branches not thread-like.
 C. Stems scapose or none, or leaves only from near base.
 D. Leaves only 2 or 3.
 E. Perianth 25—75 mm. long; perianth-segments about equal in width; stamens 6. ERYTHRONIUM (p. 103)
 EE. Perianth 6—9 mm. long; inner perianth-segments narrower than the outer; stamens 3. SCOLIOPUS (p. 109)
 DD. Leaves more than 3.
 F. Plant with bulb, glabrous; leaves 12 or more times as long as wide; fruit a capsule. CAMASSIA (p. 105)
 FF. Plant with rhizome, hairy at least on the inflorescence; leaves 3—5 times as long as wide; fruit a berry. CLINTONIA (p. 107)
 CC. Stems leafy, not merely so at base.
 G. Petals very unlike the sepals in form or size or color.
 H. Leaves 3 in a whorl at the top of the stem, ovate or wider.
 TRILLIUM (p. 109)
 HH. Leaves more than 3, not in a whorl, lanceolate or narrower.
 CALOCHORTUS (p. 104)
 GG. Petals and sepals alike or very nearly so.
 I. Flowers not white, or if so 42 mm. long or longer.
 FRITILLARIA or LILIUM (p. 98, JJ)
 II. Flowers greenish-white, 2—23 mm. long.
 J. Leaves 1—3. UNIFOLIUM (p. 108)
 JJ. Leaves more than 3.
 K. Flowers in a terminal raceme or panicle; stem not branched.
 L. Style 1; fruit a berry; stem 2—9 dm. high. VAGNERA (p. 107)
 LL. Styles 3; fruit a capsule; stem 6—30 dm. high.
 VERATRUM (p. 97)
 KK. Flowers either in a terminal umbel or else axillary; stem usually branched.
 STREPTOPUS or DISPORUM (p. 106, EE)
 AA. Leaves grass-like, narrow.
 M. Plant with onion-like odor and taste. ALLIUM (p. 99)
 MM. Plant without either onion-like odor or taste.
 N. Stem none, or scapose, or leafy only near the base.
 O. Plant with rhizome.
 P. Plant stemless; flowers in a sessile umbel; bracts of the inflorescence leaf-like, about twice as long as the flower and its stalk.
 LEUCOCRINUM (p. 99)
 PP. Plant with stem 15—90 cm. high; flowers in a terminal raceme or panicle; bracts of the inflorescence not leaf-like, shorter than the flower

- and its stalk. TOFIELDIA or NARTHECIUM (p. 95, C)
- OO. Plant with bulb or corm. BREVOORTIA or HOOKERA (p. 97, BB)
- Q. Flowers in an umbel.
- QQ. Flowers in an elongated raceme or panicle.
- R. Styles 3; capsule septicidal. STENANTHIUM or ZYGADENUS (p. 95, CC)
- RR. Style 1; capsule loculicidal. CHLOROGALUM or SCHOENOLIRION or CAMASSIA (p. 97, E)
- NN. Stem not scapose, leafy and not only so at the base.
- S. Leaves very many, 50 or more, very tough and rigid, serrulate; plant with rhizome. XEROPHYLLUM (p. 96)
- SS. Leaves few, 20 or fewer, not particularly tough nor rigid, entire; plant with bulb or corm. LLOYDIA or LILIUM or FRITILLARIA or CALOCHORTUS (p. 98, EE)

MELANTHACEAE

Bunch-flower Family

Herbs, erect (ours), perennial, with rootstocks or *rarely with coated bulbs*; stem leafy (ours) or scapose. Leaves wide or grass-like, parallel-veined but often reticulate between the large veins. Flowers solitary or in a raceme or a panicle, perfect or polygamous or dioecious, regular. Perianth-segments 6, distinct or nearly so, usually persistent. Stamens 6. Ovary 3-celled, *superior or partly inferior*; styles 3, distinct or somewhat united. *Fruit a capsule, mostly septicidal, rarely loculicidal*. Seeds commonly tailed or appendaged, several to many.

- A. Leaves narrow, linear; plants glabrous (except *Tofieldia* in part).
- B. Leaves few, 25 or fewer, not rigid, not rough-margined; inflorescence bracted.
- C. Stems with rhizomes; anthers 2-celled; leaves equitant.
- D. Perianth-segments oblanceolate; pedicels bracted near the flower; filaments naked; anthers round-cordate; capsule ovate, 3-beaked, septicidal. TOFIELDIA (p. 95)
- DD. Perianth-segments lanceolate; pedicels bracted near the middle; filaments woolly; anthers linear; capsule oblong, attenuate upward, loculicidal. NARTHECIUM (p. 96)
- CC. Stems from bulbs; anthers cordate or reniform, 1-celled; leaves not equitant.
- E. Flowers nodding, yellowish-purple; perianth-segments acuminate, glandless. STENANTHIUM (p. 96)
- EE. Flowers erect, white or yellowish; perianth-segments acute or blunter, with 1—2 glands just above the narrowed base. ZYGADENUS (p. 96)
- BB. Leaves many, 50 or more, rigid, rough-margined; inflorescence bractless; anthers 2-celled; stem from a rhizome. XEROPHYLLUM (p. 96)
- AA. Leaves wide, lanceolate to broadly elliptic; stem and inflorescence pubescent; inflorescence bracted; anthers 1-celled; stem from a rhizome. VERATRUM (p. 97)

TOFIELDIA

FALSE ASPHODEL

Slender, mostly tufted; rootstocks short or creeping. Stems simple, leafy only at base. Leaves 2-ranked, equitant, linear, grass-like. Flowers in a terminal bracted spike or raceme, perfect, usually involucrate by 3 bractlets on the pedicel. Perianth persistent, more or less spreading; segments 3-veined, white or greenish, concave, oblong or obovate, without claws. Stamens equaling the perianth. Ovary sessile, 3-lobed.

Capsule septicidal, beaked by 3 persistent styles. In mountain marshes. (Honor of a Mr. Tofield, a little-known English botanist.)

A. Involucre-bracts united $\frac{2}{3}$ or more of the distance to the apex; perianth-segments 2—4 mm. long; capsule widest below the middle. W. C. E. (*T. glutinosa*.)

T. intermedia Rydb.

AA. Involucre-bracts united $\frac{1}{2}$ or less of the distance to the apex; perianth-segments about 6 mm. long; capsule widest above the middle. C.

T. occidentalis Wats.

NARTHECIUM (Abama)

BOG ASPHODEL

Stem simple; rootstocks creeping or horizontal. Leaves grass-like, linear. Flowers small, perfect, in a terminal bracted raceme; pedicels bracteolate near the middle. Perianth-segments persistent, linear-lanceolate, yellow. Stamens hypogynous; anthers introrse. Ovary sessile, linear-oblong; style none; stigma 1, 3-lobed. Capsule loculicidal. Seeds numerous, small, linear, with long bristle-like tail at each end. (An anagram of *Anthericum*, from Gr. antherikos—the supposed name of the Asphodel.) U.

N. californicum Bak.

XEROPHYLLUM

BEAR-GRASS

Stems simple, leafy; rootstocks short, woody. Leaves linear, serrulate, persistent. Inflorescence a raceme, terminal. Flowers many, small, white, perfect. Perianth-segments several-veined, persistent. Anthers extrorse. Ovary sessile, ovate, 3-lobed, its cells 2—4-ovuled; styles 3, distinct. Capsule loculicidal, sometimes also septicidal. Seed somewhat triangular-flattened, longitudinally wrinkled. In mountain meadows. (Gk. xeros=dry, phyllon=leaf.) W. C. E. (*X. douglasii*.)

X. tenax Nutt.

STENANTHIUM

Glabrous; stems leafy, from coated bulbs. Leaves narrowly linear, keeled. Flowers polygamous, in a terminal bracted panicle or raceme. Perianth-segments narrowly lanceolate, acuminate, glandless, greenish or white or brownish-purple (ours), spreading, persistent, adhering to the base of the ovary. Stamens shorter than the perianth, on its base. Ovary practically superior; styles 3, distinct. Capsule ovoid-oblong, 3-lobed, septicidal; the lobes with short divergent beaks. Seeds about 4 in each compartment. (Gk. stenos=narrow, anthos=flower; referring to the narrow perianth-segments.) W. C. (*Stenanthella occidentalis*.) *S. occidentalis* Gray

ZYGADENUS

Stems leafy, from coated bulbs. Leaves linear. Flowers rather small, white or yellowish, perfect or polygamous, in a terminal glabrous panicle or raceme. Perianth-segments similar, with 1—2 glands just above the narrowed base. Stamens free. Styles 3, distinct. Capsule 3-lobed, the compartments not diverging. Seeds several or numerous in each compartment. (Gk. zygos=a yoke, adenos=a gland; because some species have 2 glands on each perianth-segment.)

A. Perianth-segments 8—14 mm. long.

B. Gland not obcordate; perianth-segments 10—14 mm. long; leaves 12—24 mm. wide. U.

Z. douglasii Torr.

- BB. Glands obcordate; perianth-segments 8—10 mm. long; leaves 4—12 mm. wide. W. E. *Z. elegans* Pursh
- AA. Perianth-segments 2—8 mm. long.
- C. Stem-leaves not sheathing; racemes usually simple; perianth-segments 4—8 mm. long; capsule 8—12 mm. long. W. C. E. (*Z. intermedius*; *Z. gramineus*.)
Z. venenosus Wats. (Death Camas)
- CC. Stem-leaves usually sheathing; racemes usually paniced; perianth-segments 2—4 mm. long; capsule 12—24 mm. long. W. C. E.
Z. paniculatus Wats.

VERATRUM

FALSE HELLEBORE

Tall. Leaves wide, strongly veined, plicate. Flowers in a terminal pubescent panicle, rather large, the lower mostly staminate only. Perianth-segments similar. Stamens free. Ovary sessile; styles 3, distinct. Capsules membranous, 3-beaked by the persistent diverging styles, septicidal. Seeds several in each compartment, flat, margined or winged. (L. vere=true, ater=black; referring to the root.)

- A. Flowers green; panicle drooping; perianth-segments 8—15 mm. long. W. C. E.
V. viride Ait. (Green Hellebore)
- AA. Flowers white; panicle erect; perianth-segments 15—20 mm. long. W. C. E.
(*V. caudatum*.) *V. californicum* Dur. (White Hellebore)

LILIACEAE

Lily Family

Herbs (ours), perennial, with bulbs or corms or rarely with a rhizome; stems scapose or leafy, mostly simple, sometimes woody. Leaves various. Flowers perfect, regular, mostly conspicuous. Perianth-segments 6, distinct or united, mostly alike in color and form (not in *Calochortus*). Stamens 6, or 3 of these replaced by staminodia, on the perianth or the receptacle. Styles none (*Calochortus*), or united partly or wholly. Stigmas either 3, or else 1 and entire or 3-lobed. Ovary 3-celled, superior (ours) or partly inferior. Fruit a capsule, mostly loculicidal (septicidal in *Calochortus*), or fleshy and indehiscent (not in ours).

- A. Perianth-segments plainly united; inflorescence with scarious bracts; leaves linear.
- B. Plants with rhizomes; perianth salverform, white, tube very narrow, segments several-veined; pedicels not jointed; anthers circinate when dry.

LEUCOCRINUM (p. 99)

- BB. Plants with coated bulbs; perianth not salverform, mostly not white, segments 1-veined; pedicels jointed; anthers not circinate.

C. Perianth funnelform, not saccate at base, various in color. HOOKERA (p. 101)

CC. Perianth broadly tubular, 6-saccate at base, deep-scarlet with yellowish lobes. BREVOORTIA (p. 102)

- AA. Perianth-segments distinct, or slightly united at base (some species of *Allium*); leaves various; plants from scaly or solid bulbs.

D. Odor onion-like; flowers in a terminal umbel, on a scapose stem; inflorescence subtended by a whorl of 2—5 scarious bracts which are distinct or united.

ALLIUM (p. 99)

- DD. Odor none or not onion-like; flowers not in umbels, or if so stems not scapose; inflorescence not subtended by a whorl of scarious bracts.

E. Inflorescence distinctly a raceme or panicle, with scarious bracts; pedicels jointed; anthers versatile.

F. Stem simple; inflorescence a raceme; perianth-segments 3—7-veined, 17—30 mm. long. CAMASSIA (p. 105)

- FF. Stem branched; inflorescence a raceme or panicle; perianth-segments 1—3-veined.
- G. Stem-leaves few; perianth-segments 5—10 mm. long, apparently 1-veined but closely 3-veined; style short. *SCHOENOLIRION* (p. 98)
- GG. Stem-leaves rather numerous; perianth-segments 16—20 mm. long, plainly 3-veined; style long. *CHLOROGALUM* (p. 98)
- EE. Inflorescence not distinctly racemose, with foliaceous bracts or none; pedicels not jointed; anthers basifixed (except in *Lilium*).
- H. Perianth-segments all alike; capsule loculicidal; style present.
- I. Leaves only 2, basal, wide; capsule 3-angled. *ERYTHRONIUM* (p. 103)
- II. Leaves more than 2, not all basal.
- J. Perianth-segments 0.8—1 cm. long, white; stem 5—13 cm. high; leaves grass-like, not in a whorl, basal ones exceeding the stem; capsule 3-angled. *LLOYDIA* (p. 104)
- JJ. Perianth-segments 2.5—10 cm. long, mostly not white; stem mostly higher; leaves mostly not grass-like, often in whorls, not exceeding the stem; capsule 6-angled.
- K. Perianth-segments oblanceolate; nectary a linear groove; anthers versatile; bulb-scales lanceolate. *LILIUM* (p. 102)
- KK. Perianth-segments lanceolate; nectary a shallow pit; anthers basifixed; bulb-scales wider than lanceolate, very thick. *FRITILLARIA* (p. 102)
- HH. Outer perianth-segments smaller than the inner, greenish; capsule septicidal; style none. *CALOCHORTUS* (p. 104)

SCHOENOLIRION (Hastingsia)

Perennial, with coated bulbs or short rhizomes. Stems scape-like, sparingly branched, thickened at the surface of the ground. Leaves basal, numerous, long-linear. Flowers small, numerous, whitish or yellowish-green, in a bracted raceme or panicle. Perianth persistent, somewhat scarious; segments distinct, oblong to lanceolate, 1-veined or closely 3-veined, not twisted when old. Stamens 6, on the base of the perianth; anthers versatile. Ovary ovoid, very short-stalked; cells 2-ovuled; style short, persistent. Seeds oblong, black, shining. (Gk. *schoenos*=a reed, *lirion*=a lily; apparently referring to the reed-like stems.)

- A. Raceme dense; perianth-segments about 5 mm. long, obtuse; stamens about as long as the perianth. U. C. *S. album* Dur.
- AA. Raceme loose; perianth-segments 8—10 mm. long, acuminate; stamens about $\frac{1}{2}$ as long as the perianth. U. *S. bracteosum* (Wats.)

CHLOROGALUM

SOAP-ROOT

Coarse, with fibrous-coated (ours) or membrane-coated bulbs; stems scape-like, paniculately branched above. Leaves narrow, basal. Flowers small, on jointed pedicels, in a bracted panicle. Perianth white or pinkish; segments distinct, oblong or narrowly ligulate (ours), more or less spreading, at length twisted over the ovary, persistent; veins 3, distinct but close together near the middle. Stamens 6, on the base of the perianth; anthers versatile. Ovary sessile or nearly so; cells 2-ovuled; style filiform, slightly 3-cleft at apex, deciduous. Capsule widely turbinate, 3-lobed. Seeds 1—2 in each cell, obovate, blackish. (Gk. *chloros*=green, *gala*=milk; from the greenish-white juice.) U. C. *C. pomeridianum* Kunth

LEUCOCRINUM

Low, perennial, acaulescent, with short rootstocks. Leaves narrow, surrounded at base by scarious bracts. Flowers white, in a sessile umbel, pedicels and ovaries underground and sheathed by floral bracts. Perianth salverform, persistent; segments several-veined, united. Stamens 6, on the perianth; anthers attached near base. Ovary sessile, ovate-oblong; style persistent, filiform-tubular, tip 3-lobed; ovules several in each cell. Capsule triangular-obovate. Seeds obovate, strongly angled, black. (Gk. leukos=white, krinon=a lily; the white flower is Lily-like.) E.

L. montanum Nutt.

ALLIUM

ONION

Perennial, mostly with coated bulbs, with onion-like odor; stems scapose. Leaves basal, linear or lanceolate. Flowers in a simple terminal umbel; pedicels not jointed. Perianth-segments nearly equal, distinct, lanceolate to linear, more or less spreading, 1-veined, more or less gibbous at base, subtended by 2—3 bracts; the bracts membranous, united or distinct. Stamens 6, on the base of the perianth; anthers versatile. Ovary sessile, subglobose, deeply 3-lobed; cells 1- to several-ovuled; style filiform. Capsule obtusely 3-lobed. Seed obovoid, wrinkled, black. (A Latin name for Garlic.)

A. Perianth-segments acute or blunter.

B. Perianth shorter than the stamens; bulb-coat not reticulate. W. C.

A. cernuum Roth

BB. Perianth longer than the stamens.

C. Perianth twice as long as the stamens.

D. Ovary plainly 6-crested at the summit; bulb-coat not reticulate. W. E.

A. crenulatum Weig.

DD. Ovary obscurely crested or ridged.

E. Bulb-coat reticulate; umbel nodding; flowers white; perianth 8 mm. long.

E. *A. collinum* Dougl.

EE. Bulb-coat not reticulate; umbel not nodding; flowers red or white; perianth 10 mm. long. E.

A. tolmiei Bak.

CC. Perianth $1\frac{1}{2}$ times as long as the stamens or shorter; bulb-coat reticulate in some species.

F. Leaves longer than the scape; perianth-segments acute or obtuse, not apiculate; bulb ovoid.

G. Spathe of 2 bracts.

H. Leaves about 4 mm. wide; bracts of the spathe acuminate; pedicels 8—16 mm. long; perianth-segments acute, entire. E.

A. watsoni How.

HH. Leaves less than 2 mm. wide; bracts of the spathe acute; pedicels 2—4 mm. long; perianth-segments obtuse, delicately denticulate. E.

A. simillimum Hend.

GG. Spathe of 3 bracts. U.

A. tribracteatum Torr.

FF. Leaves shorter than the scape; perianth-segments acute or apiculate.

I. Perianth-segments entire, not cuspidate.

J. Bulb ovoid; bulb-coat not fibrous; scape 1—2 dm. high; bracts of the spathe 8—10 mm. long, acute. E.

A. madidum Wats.

- JJ. Bulb oblong; bulb-coat fibrous; scape 2.5—3.3 dm. high; bracts of the spathe 12—21 mm. long, acuminate. C. E.
A. geyeri Wats.
- II. Inner perianth-segments serrulate, abruptly cuspidate. E.
A. acuminatum cuspidatum Fer.
- AA. Perianth-segments acuminate.
- K. Scape terete or nearly so.
- L. Inner perianth-segments serrulate.
- M. Perianth-segments $1\frac{1}{2}$ the stamen-length or less, their tips recurved.
- N. Perianth-segments 10—14 mm. long, not cuspidate. W. C. E.
A. acuminatum Hook.
- NN. Perianth-segments shorter, abruptly cuspidate. E.
A. acuminatum cuspidatum Fer.
- MM. Perianth-segments twice the stamen-length, almost straight. U. E.
A. bolanderi Wats.
- LL. Perianth-segments entire.
- O. Ovary not crested; bulb-coat not reticulate.
- P. Flowers dark red; scape 17—37 cm. high; bulb ovate. E.
A. douglasii Hook.
- PP. Flowers rose-color; scape 30—60 cm. high; bulb oblong. E. (*A. sibiricum*; *A. schoenoprasum* of How. Fl.)
A. schoenoprasum sibiricum Hartm. (Chives)
- PPP. Flowers white to pinkish; scape 2.5—10 cm. high; bulb ovate. E.
A. macrum Wats.
- OO. Ovary crested; bulb-coat reticulate in some species.
- Q. Umbels few-flowered; bulb-coat obscurely or not at all reticulate; scape 7.5—20 cm. high; bracts of spathe acuminate; flowers white or rose-color. E. *A. nevii* Wats.
- QQ. Umbels many-flowered.
- R. Bracts of the spathe abruptly acute; scape 15—50 cm. long; flowers white or rose-color. C. E.
A. attenuifolium Kell.
- RR. Bracts of the spathe acuminate.
- S. Scape 10—30 cm. long; flowers pink or crimson; bulb-coat reticulate. E. *A. serratum* Wats.
- SS. Scape 25—63 cm. long; flowers white or rose-color; bulb-coat fibrous. C. E.
A. geyeri Wats.
- KK. Scape flattened, somewhat 2-edged (somewhat 3-angled below in *A. validum*.)
- T. Scape 30—75 cm. long, longer than the leaves; stamens exserted. C.
A. validum Wats.
- TT. Scape 5—15 cm. long, as long or shorter than the leaves; stamens included.
- U. Perianth-segments 15—17 mm. long, serrulate. U.
A. falcifolium H. & A.
- UU. Perianth-segments 6—12 mm. long, entire.
- V. Perianth-segments very little longer than the stamens. E.
A. anceps Kell.
- VV. Perianth-segments nearly twice as long as the stamens.
- W. Ovary not crested, its cells shortly apiculate. E.
A. cusickii Wats.
- WW. Ovary 6-crested. E.
A. pleianthum Wats.

HOOKERA (Brodiaea)

FOOL'S ONION

Perennial; corms coated, with fibrous membranes; stem scapose. Leaves narrow. Flowers blue or purple or white or yellow, solitary or in a bracted umbel, on jointed pedicels. Perianth of united segments, persistent, narrowly funnellform to campanulate, not contracted at the throat, not saccate or only slightly so; segments 1-veined. Stamens either 6, of which 1 is opposite each perianth-segment and more or less united with it; or only 3, the 3 outer replaced by staminodia. Ovules 3—8 in each cell; style persistent, about equaling the anthers; stigmas 3, short, divergent. Capsule ovate-oblong, more or less attenuate above. Seeds angled, black. (Honor of J. Hooker, an English botanist.)

A. Stamens with anthers 3, alternating with 3 antherless staminodia; anthers basifixed; capsule subsessile.

B. Scapes 7—25 cm. high; pedicels 12—100 mm. long; capsules about 6 mm. long. W. (*B. grandiflora*; *B. minor*.)

H. coronaria Salisb. (Harvest Fool's-onion)

BB. Scapes 30—120 cm. high; pedicels 2—6 mm. long; capsule about 10 mm. long.

C. Scape 6—12 dm. high, smooth; umbel often elongated into a dense short raceme; staminodia deeply cleft, projecting beyond the anthers; seeds usually 1 in each cell. W. C. (*B. congesta*.)

H. pulchella Salisb. (Ookow)

CC. Scape 3—6 dm. high, somewhat scabrous; umbel never elongated; staminodia entire, obtuse, about equaling the anthers; seeds several in each cell. U.

H. multiflora (Benth.) Britten, Journ. Bot. 24; 51, 1886.

AA. Stamens with anthers 6; anthers versatile (except in *H. capitata*); capsule stipitate (except in *H. capitata*.)

D. Perianth blue or purple or white.

E. Perianth-lobes from slightly longer to much shorter than the tube; perianth usually blue or purple, but sometimes white.

F. Stamens in 2 rows.

G. Filaments of the inner row of stamens narrow; flowers dark blue. E.

H. douglasii Pip. (= Wats.)

GG. Filaments of the inner row of stamens broad; flowers light blue.

H. Perianth lobes nearly as long as the tube. W. E.

H. howellii Pip.

HH. Perianth-lobes much shorter than the tube. E.

H. bicolor Pip.

FF. Stamens in one row.

I. Perianth 1.2—2 cm. long, the lobes slightly longer than the tube; pedicels 1—12 mm. long. U. C.

H. capitata (Benth.) ~~Jepson~~ O. Kuntze, Rev. Gen. Pl. 2: 712, 1891.

II. Perianth 2.5—3 cm. long, the lobes slightly shorter than the tube; pedicels 12—50 mm. long. U. S.

H. bridgesii (Wats.) O. Kuntze, Rev. Gen. Pl. 2: 712, 1891.

EE. Perianth-lobes more than twice as long as the tube; perianth white, with green mid-vein; stamens in 2 rows. W. E. (*B. lacta*.)

H. hyacintha Kuntze

DD. Perianth yellow, with blue mid-veins; stamens in 2 rows. U.

H. hendersoni (Wats.)

BREVOORTIA

Bulbs coated; stems scapose. Leaves all basal. Flowers showy, on jointed pedicels, in a head-like umbel. Perianth persistent, broadly tubular, shortly 6-saccate at the truncate base, slightly constricted above; segments short, united, usually erect, faintly 1-veined. Stamens 3, on the throat of the perianth, opposite the 3 inner segments; staminoda 3, opposite the outer segments, very wide, truncate; filaments very short, naked; anthers basifixed. Ovary stipitate; cells 4—6-ovuled; style elongate, persistent. Capsule triangular-ovate, acuminate. Seeds angular, black. (Honor of J. C. Brevoort, of New York.) U. C. (*B. coccinea*.)

B. idamaia Wood (Ida May's Fire-crackers)

LILIUM

LILY

Bulbs scaly; stems leafy, simple. Leaves flat, sessile, whorled or scattered, netted-veined but the chief veins from the base. Flowers in bracted racemes or umbel-like clusters, usually large; pedicels not jointed, with foliaceous bracts. Perianth funnellform; segments equal, deciduous, netted-veined, with nectar-groove toward the base. Stamens 6, hypogynous, included; anthers versatile, extrorse. Ovary sessile; ovules many; style long, clavate, mostly deciduous; stigmas 3-lobed. Capsule somewhat 6-angled, erect. Seeds numerous, flat, brownish. (The Latin name.)

A. Flowers orange-yellow or reddish, mostly conspicuously spotted.

B. Flowers nodding; perianth-segments 3.3—7.5 cm. long; capsule oblong, 2.5—4 cm. long.

C. Leaves oblanceolate, acute; perianth-segments 3.7—5 cm. long, 8—12 mm. wide; anthers yellow, 4—6 mm. long; capsule short-oblong, 2.2—2.8 cm. long.

W. C. (*L. columbianum*; *L. purdyi*.)

L. parviflorum Holz. (Wild Tiger-lily)

CC. Leaves narrowly lanceolate, sharply acuminate; perianth-segments 5—7.5 cm. long, 12—18 mm. wide; anthers red, 4—10 mm. long; capsule narrowly oblong, 3.7—4 cm. long. W. C.

L. pardalinum Kell.

BB. Flowers erect or nearly so; perianth-segments 2.5—3.8 cm. long; capsule subglobose, 1.2—2 cm. long. C.

L. parvum Kell. (Small Lily)

AA. Flowers white or purplish or pale yellow or red, finely spotted or spotless.

D. Flowers dull purplish-red outside, bright-red and dotted with maroon inside. U.

L. bolanderi Wats. (Red Lily)

DD. Flowers white or pale-lilac, becoming tinged with rose or purple when old, mostly dotted with purple or brown.

E. Flowers horizontal, finely dotted with purple; perianth-segments 7.5—10 cm. long; anthers 10—12 mm. long. U. C.

L. washingtonianum Kell. (Washington Lily)

EE. Flowers erect or ascending, somewhat dotted with brown; perianth-segments 4—7.5 cm. long; anthers 4—6 mm. long. U.

L. rubescens Wats. (Brown-spotted Lily)

FRITILLARIA

RICE-ROOT

Bulbs scaly; stems simple, leafy. Leaves flat, sessile, whorled or scattered. Flowers usually large, solitary or in a raceme or subumbellate cluster with foliaceous bracts; pedicels not jointed. Perianth funnellform or campanulate; segments equal, deciduous,

with a nectar-groove toward the base. Stamens 6, hypogynous, included; anthers versatile, extrorse. Ovary sessile or nearly so; ovules many; styles long, united at least to the middle; stigma 3-lobed. Capsule somewhat 6-angled. Seeds numerous, flat. (L. fritillus—a dice-box; the mottled petals of many species apparently suggested dice.)

A. Flowers yellow, sometimes with a slight purplish tinge, not spotted; stigma shortly 3-lobed; capsule obtusely angled. E.

F. pudica Spreng. (Yellow Rice-root)

AA. Flowers brownish-purple, more or less spotted with green; stigmas 3, linear; capsule acutely angled (except *F. camtschatcensis*).

B. Flowers distinctly mottled; capsule acutely angled.

C. Flowers 2.2—2.8 cm. long; leaves mostly scattered; capsule merely acute-angled.

D. Plant 20—50 cm. high; leaves 6—20, linear, not glaucous; stamens about 8 mm. long. C. E. *F. atropurpurea* Nutt.

DD. Plant 5—20 cm. high; leaves 2—4, oblong-lanceolate, glaucous; stamens about 12 mm. long. U.

F. glauca Gr.

CC. Flowers 1.2—2 cm. long; leaves usually 5 in a whorl near the middle of the stem, lanceolate to linear-lanceolate; capsule broadly winged. W. C. E.

F. lanceolata Pursh (Whorled Rice-root)

BB. Flowers obscurely mottled; capsule obtusely angled. W. C.

F. camtschatcensis KG.

AAA. Flowers yellow outside, yellow and spotted with scarlet inside; stigmas 3, linear; capsule obscurely angled. U.

F. recurva Benth.

ERYTHRONIUM

DOG-TOOTH VIOLET

Low, with membrane-coated corms; stems scape-like. Leaves 2—3, basal, flat, smooth, tapering at base. Flowers large, solitary or in a terminal raceme. Perianth broadly funnel-form; segments distinct, nearly equal, lanceolate, deciduous, mostly revolute from near the base, the inner usually with a callous tooth on each side of the base and a groove in the middle. Stamens 6, hypogynous. Ovary nearly sessile; style either slender and stigma 3-lobed, or else 3-cleft and the 3 stigmas becoming revolute. Capsule obovoid, membranous, obtusely 3-angled, 3-valved. Seeds many. (Gk. erythros—red; because some European species have reddish flowers.)

A. Leaves mottled.

B. Flowers somewhat purple specially on the inside, often with some white or yellow.

C. Perianth-segments acuminate, white or pinkish-rose outside, golden-orange deepening to purple on the inside; anthers bright yellow. W.

E. revolutum Sm.

CC. Perianth-segments obtuse, dark purple at base, bordered with yellow above; anthers brownish. U. *E. hendersoni* Wats.

BB. Flowers white or yellow or pink, without purple.

D. Inner perianth-segments with neither auricles nor scales; stigmas faintly lobed; leaves acute. U. *E. howellii* Wats.

DD. Inner perianth-segments with scales and sometimes with auricles; stigmas plainly lobed or segmented.

E. Leaves acute; outer perianth-segments acuminate, 3.2—5 cm. long; stigmas distinct. W. *E. giganteum* Lindl.

EE. Leaves obtuse; outer perianth-segments obtuse, 2.5—3.2 cm. long; stigmas united by their edges. U.

E. citrinum Wats.

AA. Leaves not mottled.

F. Flowers white, orange at base, often pinkish when old; outer perianth-segments acuminate. W. C. *E. montanum* Wats.

FF. Flowers bright-yellow, whitish at base; outer perianth-segments obtuse.

G. Anthers white; flowers 2.5—3.2 cm. long. W. C. E. (*E. grandiflorum parviflorum*.) *E. parviflorum* Good.

GG. Anthers purple; flowers 3.7—7.5 cm. long. E.

E. grandiflorum Pursh

LLOYDIA

Bulbous; stems simple, leafy. Leaves grass-like. Flowers solitary, or in a terminal raceme or panicle. Perianth-segments whitish, equal, distinct, persistent, with a transverse margined nectariferous fold above the base. Stamens 6, on the base of the perianth; anthers versatile. Ovary 3-angled; style 1, persistent; stigma short, 3-lobed. Capsule 3-valved at apex. Seeds many, flat, brown. (Probably in honor of J. A. Lloyd, an English surveyor and naturalist.) W. C. E.

L. serotina Sweet (White-flowering Grass)

CALOCHORTUS

MARIPOSA LILY

Perennial, with coated bulbs; stems simple or branched, leafy. Leaves linear-lanceolate, only 1 basal (ours), many-veined, those on the stem clasping. Flowers in a terminal bracted raceme. Sepals 3, lanceolate, greenish. Petals 3, cuneate-obovate, wide, variously colored, usually with a conspicuous glandular pit near the base. Stamens 6, on the base of the perianth-segments, included; anthers linear. Ovary sessile, 3-angled; ovules many; stigmas 3, sessile, recurved, persistent. Fruit elliptical to oblong, thin, 3-angled or 3-winged, mostly septicial. Seeds many. (Gk. kalos=beautiful, chortos=grass; referring to the leaves.)

A. Flowers pink or purplish or lavender, sometimes of a different color at base.

B. Petals acute or acuminate.

C. Stems 3—6 dm. high; petals 3.5—5 cm. long; anthers obtuse, 8—12 mm. long.

D. Petals purple, hairy $\frac{1}{2}$ way up inside. E.

C. macrocarpus Dougl.

DD. Petals pale-blue, hairy only $\frac{1}{5}$ way up inside. E.

C. cyaneus Nels.

CC. Stems 0.7—2.5 dm. high; petals 1.2—1.7 cm. long; anthers acuminate, about 4 mm. long. U. (*C. maweanus roseus*.)

C. maweanus Leicht.

BB. Petals obtuse to truncate.

E. Petals denticulate.

F. Sepals ovate-lanceolate; petal often with a purple spot on each side of the scale; anthers obovate; capsule nodding. U.

C. uniflorus H. & A.

FF. Sepals narrowly lanceolate; petals with a purple band above the gland; anthers ovate; capsule erect. E.

C. longibarbatulus Wats.

EE. Petals entire.

- G. Sepals 3.2—3.7 cm. long, hyaline-margined on 1 side; anthers obtuse, 12—17 mm. long. E. (*C. pavonaceus*)

C. nitidus Dougl.

- GG. Sepals 1.2—2.1 cm. long; anthers acute, 4—8 mm. long.

- H. Sepals hyaline-margined on 1 side; petals white with dark base, with short hairs inside; petal-gland transversely oblong; capsule 1.7—2.1 cm. long, erect. W. *C. howellii* Wats.

- HH. Sepals not hyaline-margined; petals yellowish-purple, with long hairs inside; petal-gland rounded; capsule 2.1—3.1 cm. long, nodding. W. *C. tolmiei* H. & A.

AA. Flowers white or yellowish, usually darker at base.

- I. Sepals 3.5—4 cm. long, hyaline-margined on 1 side; petals with an indigo spot near the center. E. (*C. pavonaceus*)

C. nitidus Dougl.

- II. Sepals 2.5 cm. long or shorter, either hyaline-margined on both sides or on neither; petals without spot other than gland (except *C. elegans*).

- J. Petals narrowly ovate, acute; pod erect. C. E.

C. lyallii Bak.

- JJ. Petals broadly rhombic-ovate or broadly obovate, obtuse to rounded (except *C. maweanus*).

- K. Sepals somewhat yellowish inside; anthers obtuse; capsule erect. C. E.

C. nuttallii T. & G. (Sego Lily)

- KK. Sepals not yellowish inside; anthers acuminate; capsule nodding.

- L. Petals yellowish at least in part.

- M. Petals thinly hairy on the inside, gland naked; sepals without pit at base inside; anthers acuminate. E.

C. apiculatus Bak.

- MM. Petals densely hairy on the inside, gland more or less covered by a scale.

- N. Stem 1.5—2 dm. high; leaf 3—8 mm. wide; sepals with purple pit at base inside; anthers long-acuminate. C. (*C. lyallii* of How. Fl.)

C. subalpinus Pip.

- NN. Stem 2—4 dm. high; leaf 8—12 mm. wide; sepals without pit; anthers abruptly acuminate. W.

C. purdyi Eastw.

- LL. Petals without yellow color.

- O. Petals acute, white or tinged with rose, sometimes purplish at base; anthers without hook at tip; capsule acute to obtuse. U. (*C. maweanus roseus*.)

C. maweanus Leicht.

- OO. Petals obtuse, white or greenish, sometimes with a purple spot at base; anthers without hook at tip; capsule rounded at apex. U. E. (*C. nanus*.)

C. elegans Pursh

- OOO. Petals obtuse, white or greenish, without purple; anthers with hook at tip; capsule narrowly beaked. C.

C. lobbii Purdy

CAMASSIA (Quamasia)

CAMASS

Perennial, with tunicated bulbs; stems scapose. Leaves usually basal, flat. Flowers blue to white, rather large, in a simple bracted raceme. Perianth-segments distinct, 3—7-veined, persistent. Stamens 6, inserted on the base of the perianth, shorter than the perianth; anthers introrse, versatile. Ovary sessile; style filiform, slightly 3-lobed at the

apex, its base persistent. Capsule 3-lobed and 3-angled, 3-valved. Seeds several in each cell, black. (The Indian name was Camass or Quamash.)

A. Perianth irregular, its segments 3—5-veined; leaves 6—16 mm. wide; bracts of the inflorescence subulate. W. E. (*C. azurea*; *Q. quamash*; *C. esculenta* for our region.) *C. guamash* Gr.

AA. Perianth regular.

B. Leaves 12 mm. or less wide.

C. Bracts of the inflorescence lanceolate or linear-lanceolate.

D. Flowers blue or white; perianth-segments usually 7-veined; capsule conspicuously veined. W. C. (*Q. leichtlinii*.)

C. leichtlinii Wats.

DD. Flowers blue; perianth-segments usually 5-veined; capsules not conspicuously veined. E. (*Q. suksdorfii*.)

C. suksdorfii Greenm.

CC. Bracts of the inflorescence filiform-subulate. U.

C. howellii Wats.

BB. Leaves 13—37 mm. wide; perianth-segments 3—5-veined. E.

C. cusickii Wats.

CONVALLARIACEAE Lily-of-the-Valley Family

Herbs, erect, perennial, with rhizomes, never with bulbs nor corms; tendrils none. Leaves either wide or scale-like, simple, alternate or whorled or basal; wide leaves parallel-veined or with chief veins from the base, sometimes reticulate with cross-veinlets; scale-leaves minute; axillary branches filiform, or flattened and leaf-like. *Flowers regular, perfect, solitary or axillary or in 1 or more racemes or panicles or umbels.* Perianth-segments 6 or rarely 4, distinct or partly united; tube oblong to urn-shaped, 6-lobed or 6-toothed. Stamens 4 or 6, hypogynous or on the perianth. Ovary 1—3-celled, superior; styles 1 or 3; stigma 2—3-lobed or entire. *Fruit a fleshy berry or rarely a capsule.* Seeds few to many.

A. Leaves minute, scale-like; stem much branched; ultimate branchlets thread-like. ASPARAGUS (p. 107)

AA. Leaves large, foliaceous, wide; stems simple or sparingly branched; branchlets not thread-like.

B. Leaves not 3, or if so not in a whorl on the stem; flowers either more than 1 or not terminal (except *Clintonia*); none of the perianth-segments dark-green.

C. Perianth-segments alike; fruit a berry; leaves more than 2 (except *Unifolium*); stem plainly above ground (except *Clintonia*.)

D. Leaves all basal, gradually narrowed to a petiole; leaf-blade widest above the middle. CLINTONIA (p. 107)

DD. Leaves alternate and scattered along an elongated stem, or only 1, either without petiole or abruptly petioled; leaf-blade widest below the middle.

E. Leaves 1—3, with slender petiole; perianth-segments 4; stamens 4; ovary 2-celled; stem simple. UNIFOLIUM (p. 108)

EE. Leaves more than 3, sessile or very nearly so; perianth-segments 6; stamens 6; ovary 3-celled.

F. Flowers many, in a terminal raceme or panicle; stem simple; leaves not oblique at base; berry 1—3-seeded. VAGNERA (p. 107)

FF. Flowers few, in a terminal umbel; stem branched; leaves somewhat oblique at base; berry 3- to many-seeded. DISPORUM (p. 108)

FFF. Flowers few, axillary, solitary or 2 on a forked peduncle; stem simple or branched; leaves not oblique at base; berry many-seeded.

STREPTOPUS (p. 109)

CC. Perianth-segments unlike; fruit a capsule; leaves 2; stem hardly rising above the ground.

SCOLIOPUS (p. 109)

BB. Leaves 3, in a whorl near the stem-tip; flower 1, terminal; perianth of 3 dark-green and 3 brighter-colored segments.

TRILLIUM (p. 109)

ASPARAGUS

Rhizome much-branched; stem at first simple, fleshy, scaly; later much branched; branchlets filiform and mostly clustered in the axils of the scales (ours); or axillary branches flattened and leaf-like (not ours). Flowers small, solitary in the axils, or in umbels or racemes. Perianth-segments 6, similar, separate or slightly united at the base. Stamens 6, at base of perianth. Ovary sessile, 3-celled; cells 2-ovuled; stigmas 3, short, recurved. Fruit a berry, globose. Seeds few. (The Greek name for similar plants.)

W. E.

A. officinalis L. (Garden Asparagus)

CLINTONIA

CLINTONIA

Acaulescent; rhizome slender. Leaves basal, few, wide, many-veined. Inflorescence umbel-like, or flower 1; peduncle scape-like. Flowers white or red. Perianth campanulate, deciduous; segments 6, equal, several-veined. Stamens 6, on base of perianth; anthers versatile; ovary sessile, 2—3-celled; style slender, deciduous, slightly 2—3-lobed at the summit. Fruit a berry, smooth. Seeds smooth, few to many. (Honor of DeWitt Clinton, a former governor of New York.)

A. Plant somewhat villous-pubescent thruout; leaves 10—20 cm. long, 2.5—5 cm. wide; peduncle shorter than the leaves; flowers 1, rarely 2; perianth white, 16—24 mm. long. W. C. E. *C. uniflora* Kunth

AA. Plant nearly glabrous; leaves 15—30 cm. long, 5—10 cm. wide; peduncle longer than the leaves; flowers numerous; perianth deep-rose, 8—14 mm. long. U.

C. andrewsiana Torr.

VAGNERA (Smilacina) FALSE SOLOMON'S SEAL

Stems simple, scaly below, leafy above. Leaves wide, alternate, simple, mostly sessile but sometimes short-petioled. Flowers small, in a terminal bracted raceme or panicle. Perianth-segments 6, distinct, white or greenish-white, equal, spreading, 1—3-veined. Stamens 6, on base of perianth; anthers introrse. Ovary 3-celled, sessile; cells 2-ovuled; stigma obscurely 3-lobed. Fruit a berry, globose; seeds 1—3. (Probably in honor of M. Wagner, a German traveler and naturalist.)

A. Inflorescence a raceme, 3—20-flowered; flowers 6—10 mm. long; perianth shorter than the stamens.

B. Leaves spreading, flat; racemes 3—9-flowered; perianth twice as long as the stamens; rhizome slender. W. C. E.

V. sessilifolia Greene

BB. Leaves ascending, folded; raceme 6—20-flowered; perianth less than 1½ times as long as the stamens; rhizome stout, fleshy. E.

V. stellata Mor.

AA. Inflorescence a panicle, many-flowered; flowers 2 mm. or less long; perianth longer than the stamens.

- C. Leaves acuminate, the lower ones with a very short petiole, not clasping. W. E.
V. racemosa Mor. (Wild Spikenard)
- CC. Leaves acute, all sessile, more or less clasping. W. C. E. (*V. amplexicaulis*
brachystylis.) *V. amplexicaulis* Gr.

UNIFOLIUM

Low; rhizomes slender. Stem simple. Leaves wide, few, simple, alternate, petioled (ours) or sessile. Flowers small, white; in a terminal minutely-bracted raceme or panicle; pedicels often 2—4 together. Perianth-segments 4, distinct, equal. Stamens 4, on base of perianth; anthers introrse. Ovary sessile, 2—3-celled; cells 2-ovuled; style 2-lobed or -cleft. Fruit a berry, globose. Seeds 1—4. (L. unus=1, folium=leaf; because sterile plants usually have but 1 leaf.) W. C. (*V. dilatatum*.)
U. bifolium kamtshaticum Pip. (Wild Lily-of-the-Valley)

DISPORUM (Prosartes)

FAIRY-BELLS

Rhizomes runner-like; stem scaly-bracted below, leafy above, branched. Leaves wide, sessile, alternate, somewhat oblique. Flowers rather small, in a terminal few-flowered umbel. Perianth narrowly campanulate; segments 6, distinct, deciduous. Stamens 6, hypogynous; anthers extrorse. Ovary sessile, 3-celled; cells mostly 2-ovuled; style slender, deciduous; stigmas 1 or 3. Fruit a berry. Seeds globose, 3—many. (Gk. dis=double, spora=seed; because the cells of the ovary are 2-ovuled.)

- A. Leaves rounded or slightly cordate at base, not clasping; stigma 3-cleft.
- B. Plant much-branched; perianth-segments 12—22 mm. long; stamens about $\frac{2}{3}$ as long as the perianth; berry short-beaked, nearly smooth except at beak, 3—6-seeded. W. C. (*D. menziesii*.)
D. smithii Pip.
- BB. Plant sparingly branched; perianth-segments 12—14 mm. long; stamens about equaling the perianth; berry not beaked, papillose, 3—18-seeded. E. (*D. trachycarpum*.)
D. majus Brit.
- AA. Leaves mostly cordate at base (except *D. trachyandrum*), at least the lower mostly clasping; stigma entire.
- C. Leaves averaging about 3.7—5 cm. long; stamens more than $\frac{2}{3}$ as long as the perianth; filaments elongated, longer than the anthers.
- D. Leaves long-acuminate; pedicels woolly-pubescent; stamens about $1\frac{1}{2}$ times as long as the perianth; berry acutish. W. C. E.
D. oreganus B. & H.
- DD. Leaves acute or short-acuminate; pedicels not woolly-pubescent; stamens about equaling or shorter than the perianth; berry beaked or obtuse.
- E. Leaves deeply cordate at base; stamens about equaling the perianth; ovary pubescent, obtuse. U.
D. hookeri B. & H.
- EE. Leaves rounded to cordate at base; stamens about $\frac{2}{3}$ as long as the perianth; ovary glabrous, with short stout beak. U.
D. trachyandrum B. & H.
- CC. Leaves averaging about 2.5 cm. long; stamens $\frac{1}{2}$ as long as the perianth; filaments very short, much shorter than the anthers. U.
D. parvifolium B. & H.

STREPTOPUS

TWISTED-STALK

Stem branched or simple. Leaves wide, alternate, sessile. Flowers axillary, solitary or 2 on a forked peduncle. Perianth either narrowly campanulate or rotate; segments 6, distinct, deciduous. Stamens 6, on base of perianth; anthers sagittate. Ovary sessile, 3-celled; cells many-ovuled; style deciduous; stigma 3-lobed or -cleft or entire. Fruit a berry. Seeds oblong, many. (Gk. streptos=twisted, pous=foot; because the peduncles are bent or twisted about the middle.)

A. Flowers rotate. C. (*Kruhsea streptopoides*; *S. brevipes*.)

S. streptopoides (Ledeb.)

AA. Flowers narrowly campanulate.

B. Leaves glaucous beneath, strongly clasping at base; flowers greenish-white; perianth-segments in maturity recurved from near middle; stigma entire; anthers many times as long as the filaments. W. C. E.

S. amplexifolius DC.

BB. Leaves green on both sides, not clasping, but sessile; flowers rose-purple; perianth-segments in maturity recurved only at tip; stigma 3-cleft; anthers about equaling the filaments. W. C. E.

S. roseus Michx.

SCOLIOPUS

Glabrous, nearly acaulescent; rhizome short. Leaves 2, wide, basal, subtended by scarious sheaths. Inflorescence an umbel, few-flowered, nearly sessile. Flowers on long pedicels. Perianth-segments 6, distinct, deciduous, somewhat similar in color. Sepals 3, lanceolate, several-veined. Petals 3, narrower than the sepals, 3-veined. Stamens 3, on base of sepals; anthers extrorse. Ovary sessile, strongly 3-angled, 1-celled; placentae 3; ovules 30; style 1, persistent; stigma 1. Fruit a capsule, bursting irregularly. Seeds several, longitudinally ridged. (Gk. skolex=a worm, pous=a foot; referring to the worm-like scape.) U. C. *S. hallii* Wats. (Twin-leaf)

TRILLIUM

TRILLIUM

Glabrous; rhizome short, tuber-like; stem short, simple, with scarious sheaths at base. Leaves 3 in a whorl at the tip, wide, rather large, netted-veined but the chief veins arising at the base. Flower 1, terminal. Perianth-segments distinct. Sepals 3, green, lanceolate, spreading, persistent. Petals 3, white or red. Stamens 6, hypogynous. Ovary sessile, 3—6-angled or 3—6-lobed, 3-celled; styles 3. Fruit a capsule, 3-celled or imperfectly 1-celled, berry-like. Seeds many. (L. trilix=triple; because leaves and flower-parts are in 3's.)

A. Flowers sessile.

B. Leaves sessile, mottled; petals whitish; sepals obtuse; anthers white. W.

T. chloropetalum How. (Mottled Trillium)

BB. Leaves long-petioled, usually not mottled; petals brown-purple; sepals acute; anthers dark-purple. E. *T. petiolatum* Pursh (Purple Trillium)

AA. Flowers with peduncle 2.5—7.5 cm. long.

C. Ovary 3-lobed or -angled; leaves oblong. U.

T. rivale Wats.

CC. Ovary 6-angled; leaves rhombic-ovate. W. C. E. (*T. crassifolium*; *T. scouleri*.)

T. ovatum Pursh

SMILACEAE

Smilax Family

Shrubby or herbaceous, *climbing*. Leaves alternate, netted-veined, petioled, usually with stipular tendrils (so in ours). Flowers small, *dioicous*, in axillary umbels. Perianth-segments 6, similar. Stamens mostly 6, distinct; filaments ligulate; anthers basifixed, introrse, 2-celled. Ovary superior, 3-celled, rarely 1-celled; cells opposite the inner perianth-segments, 1—2-ovuled; style very short or none; stigmas 1—3. Fruit a berry, globose. Seeds 1—6.

SMILAX

SMILAX

Leaves broad, usually with a pair of stipular appendages. Flowers greenish or yellowish, regular. Perianth-segments distinct, deciduous. Stamens on the very base of perianth; anthers linear or oblong, apparently 1-celled. Stigmas 3, almost sessile, spreading. Fruit small. (Gk. *smile*—a grater; from the prickly-rough stems of some.) U. C.

S. californica Gray

IRIDACEAE

Flag Family

Herbs, perennial, usually with a creeping rhizome or a somewhat acrid corm. Leaves equitant, sheathing, 2-ranked, sword-like or linear, evergreen or withering in the fall. Inflorescence subtended by the spathe-like bracts. Flowers showy, perfect, regular. Perianth petal-like, 6-cleft; segments in 2 series, withering-persistent. Stamens 3, inserted on the base of the 3 outer perianth-segments; filaments filiform; anthers 2-celled, extrorse. Ovary 3-celled, inferior. Fruit a capsule, 3-lobed or 3-angled, loculicidal. Seeds few to many.

A. Perianth 30—60 mm. long, white or blue; styles petal-like; style-branches opposite the anthers. IRIS (p. 110)

AA. Perianth 6—17 mm. long; styles filiform; style-branches alternate with the anthers.

B. Flowers blue, rarely whitish; filaments united to the top.

SISYRINCHIUM (p. 111)

BB. Flowers not blue, rarely whitish; filaments united only at base.

C. Flowers yellow, with veins or stripes of black or brown or orange; scape broadly 2-winged.

HYDASTYLUS (p. 111)

CC. Flowers from whitish to bright purplish-red; scapes compressed but not winged.

OLSYNIUM (p. 112)

IRIS

FLAG

Rhizome creeping or horizontal, often woody, sometimes bearing tubers; stem rather stout, mostly terete. Leaves sword-like or linear. Flowers in a forked corymb, or only 1; spathe-bracts 2 or more, the inner scarious. Perianth-segments clawed; outer segments obovate above the narrow claw, spreading or recurved; inner segments narrower and erect; tube extending somewhat above the ovary. Anthers linear or oblong, beneath the arching style-branches. Style 3-parted; base adnate to the perianth-tube; branches thin, petal-like, resting upon the outer perianth-segments, covering the stamens; style-tip a wide 2-parted crest. Seeds numerous, in 2 rows in each cell. (Gk. *iris*—the rainbow; referring to the colors of the flowers.)

A. Flowers blue or purple.

B. Stem leafless; bracts largely scarious; perianth-tube 6—8 mm. long. W. E. (*I. longipetala* for our region.)

I. missouriensis Nutt.

- BB. Stem leafy; bracts green, not scarious.
 C. Leaves 8—16 mm. wide; flowers 2—3; perianth-tube 12—15 mm. long; capsule 3.8—4.2 cm. long. U.
I. douglasiana Herb.
 CC. Leaves 3—5 mm. wide; flower 1; perianth-tube less than 10 mm. long; capsule 1.7—2.5 cm. long. W.
I. tenax Dougl.
 AA. Flowers white or yellow, sometimes striped or blotched with other colors.
 D. Leaves not evergreen; bracts 2.5—5 cm. long.
 E. Plant 1-flowered; flower white; outer perianth-segments 5—7 cm. long; capsule oblong. W. *I. tenax* Dougl.
 EE. Plant 2-flowered; flowers white, blotched and striped with yellow and purple; outer perianth-segments 3—3.5 cm. long; capsule globose. C.
I. tenuis Wats.
 DD. Leaves evergreen; bracts 5—7.5 cm. long.
 F. Flowers yellow; perianth-tube less than 2.5 cm. long, funnellform; spathe-bracts short-acuminate. U.
I. bracteata Wats.
 FF. Flowers white to yellow, with blue veins; perianth-tube 5—7.5 cm. long, filiform; spathe-bracts long-acuminate. U.
I. chrysophylla How.

SISYRINCHIUM

BLUE-EYED GRASS

Tufted, slender, with short rhizomes; roots fibrous; stems simple or branched, 2-edged or 2-winged. Leaves linear, grass-like. Flowers in a terminal umbel, or only 1, rather small, mostly blue; spathe-bracts 2, green or purplish, erect. Perianth-tube short or none; segments 6, spreading, oblong or obovate, alike, mostly aristulate. Filaments united at least at base. Style 1, 3-cleft; stigmas filiform, alternate with the stamens. Fruit globose, oval or obovoid, 3-valved. Seeds 9—12. Mostly in wet grassy places. (Gk. *sisyrinchion*—the name of some Flag-like plant.)

- A. Inner bracts exceeding the flowers.
 B. Stem 2—3 mm. wide; perianth 12—14 mm. long, deep blue, with orange-yellow eye. W. *S. littorale* Gr.
 BB. Stem 1—1.5 mm. wide; perianth 7—10 mm. long, light-blue, without eye. C. *S. sarmentosum* Suks.
 AA. Inner bracts not reaching the tips of the flowers.
 C. Perianth 4—7 mm. long, white or pale; leaves 0.5—1 mm. wide; stem 0.5—1 mm. wide. E. *S. septentrionale* Bick.
 CC. Perianth 10—22 mm. long, dark blue; leaves 1 mm. or more wide (except *S. segetum*); stem 1 mm. or more wide (except *S. segetum*).
 D. Stem usually 2-branched. W. *S. biramium* Pip.
 DD. Stem always simple.
 E. Outer spathe-bracts 3—7 cm. long. W. E. (*S. idahoense*).
S. macounii Bick.
 EE. Outer spathe-bracts 1.8—3.8 cm. long. W. E. (*S. segetum*; *S. bellum* for our region.) *S. occidentale* Bick.

HYDASTYLUS

YELLOW STAR-GRASS

Black to purplish when dry; rhizome obscure or none; stem 2-edged, simple, scapose. Leaves narrowly linear, wider at base, somewhat equitant. Spathe-bracts 2, en-

closing membranous scales; pedicels often long-exserted; perianth-segments yellow, with veins or stripes of orange or black or brown, obtuse or acute but not aristulate nor emarginate, usually narrow. Filaments somewhat adherent near base, somewhat spreading above; anthers narrowly linear, versatile. Style-branches slender, divergent. Capsule oblong to globose or pyriform, more or less 3-angled. Seeds rounded, pitted. (Gk. *hydor*=water, *stylos*=a column; why?)

A. Perianth 8—10 mm. long; leaves 1—3 mm. wide, mostly very dark in drying; anthers 2—2.5 mm. long. W. (Partly *Sisyrinchium californicum* for our region.)

H. *borealis* Bick.

AA. Perianth 12—18 mm. long; leaves 2—5 mm. wide, mostly not very dark in drying; anthers 3—4 mm. long. W. (Partly *Sisyrinchium californicum* for our region.)

H. *brachypus* Bick.

OLSYNIUM

PURPLE STAR-GRASS

Glabrous, bright-green. Stem scapose, compressed but not margined. Leaves linear. Spathe-bracts 2, very unequal, scarious-margined, the outer the longer. Flowers 1—4, large, white to bright purplish-red, in an umbel when more than 1. Filaments wide at base, much shorter than the style. Style 3-cleft. Capsule subglobose. (Origin?) W. E. (*Sisyrinchium grandiflorum*.)

O. *grandiflorum* Raf.

ORCHIDACEAE

Orchid Family

Herbs, perennial; stems leafy or scapose or none. Leaves parallel-veined, flat. Flowers in a spike or a raceme or solitary, very irregular. Perianth superior, of 6 segments; outer-segments 3, alike or nearly so; 2 of the inner segments alike; the third inner segment (lip) unlike the other 2, often quite different, usually larger. Stamens adherent to the style forming a symmetrical column, anther opposite the lower sepal usually perfect, 2 anthers lateral to this one rudimentary (in *Cypripedium* the lateral ones perfect and the other sterile); anthers 2-celled; pollen often in 1—4 masses, rarely wholly granular. Ovary inferior; stigma oblique, concave, mostly viscous, the upper margin often produced into an erect beak. Capsule coriaceous or membranous, dehiscent usually by 3 valves, loculicidal when 3-celled. Seeds very numerous, minute, mostly spindle-shaped.

A. Plants without green herbage, often reddish, saprophytic or parasitic.

B. Stems white; flowers white, spurless.

CEPHALANTHERA (p. 115)

BB. Stems more or less purplish; flowers white or reddish, spurred.

CORALLORHIZA (p. 116)

AA. Plants with ordinary green herbage, not saprophytic nor parasitic.

C. Leaf 1; flower 1; plant bulbous.

CALYPSO (p. 117)

CC. Leaf more than 1; flower usually more than 1; plants mostly not bulbous.

D. Fertile anthers 2; lip an inflated sac.

CYPRIPEDIUM (p. 113)

DD. Fertile anther 1; lip not sac-like (except *Epipactis*).

E. Leaves 2.

F. Leaves near middle of stem, opposite.

LISTERA (p. 115)

FF. Leaves basal, alternate.

G. Leaves orbicular; flowers spurred; lip 12 mm. long. LYSIAS (p. 114)

GG. Leaves elliptic-lanceolate to oblong; flowers spurless; lip 5 mm. long, yellowish-green.

LIPARIS (p. 116)

EE. Leaves more than 2.

- H. Flower spurred; spur 2 mm. or more long.
- I. Stem-leaves abruptly reduced to bracts; leaves withering at flowering; lateral sepals with base adhering to claw of lip; tubers rounded; spike spirally twisted. PIPERIA (p. 113)
- II. Stem-leaves gradually reduced to bracts; leaves not withering until fruit is formed; lateral sepals free; tubers elongated, root-like; spike not spirally twisted. LIMNORCHIS (p. 114)
- HH. Flowers spurless.
- J. Leaves without whitish spots or lines; flowers in a dense spike which is somewhat spiral; lip not distinctly sac-like at base, with a horn-like projection on each side near base. SPIRANTHES (p. 115)
- JJ. Leaves with whitish spots or lines; flowers in a loose spike or raceme which is not at all spiral; lip sac-like at base, without projections near base.
- K. Stem leafy at least below; perianth strongly purple-veined. EPIPACTUS (p. 115)
- KK. Leaves all basal; perianth not purple-veined. PERAMIMUM (p. 115)

CYPRIPEDIUM

LADY'S-SLIPPER

Glandular-pubescent, with coarse fibrous roots. Stem leafy or scapose. Leaves large, wide, many-veined, sheathing at base. Flowers in a leafy raceme or solitary, large, showy. Sepals spreading, separate or 2 of them united under the lip. Petals similar to the sepals but usually narrower; lip an inflated sac, the incurved margin auricled near the base. Column very short, incurved, bearing at each side an anther, and bearing above a dilated sterile petal-like stamen covering the summit of the style. Anther on a short filament or sessile; pollen-masses granular, without caudicle or gland. Stigma terminal, disk-like, wide, obscurely 3-lobed. (Gk. *kypris*=Venus, *pedilon*=a shoe; the corolla is slipper-like.)

A. Stem with more than 2 leaves, 3—12 dm. high; lip 1.4 cm. or more long, color not as in AA; sepals and petals more than 2.5 cm. long (except in *C. californicum*).

B. Lip white to rose, veined with purple.

C. Flowers 1—3; sepals narrowly linear-lanceolate, 3.8—6.3 cm. long, brownish; lip 3—5 cm. long. C. E.

C. montanum Dougl. (Large Lady's-slipper)

CC. Flowers 1—20; sepals widely oval, 1.2—4.2 cm. long, greenish-yellow; lip 1.7—2.1 cm. long. U. C.

C. californicum Kell.

BB. Lip bright-yellow, 1.5—3 cm. long; flowers 1—3; sepals ovate to ovate-lanceolate, 3—5 cm. long. E.

C. parviflorum Salisb. (Yellow Lady's-slipper)

AA. Stem with 2 nearly opposite leaves near its middle and 1 small lanceolate bract above them, 0.5—5 dm. high; lip 8—13 cm. long, greenish-yellow, with brown or purplish margins; sepals and petals 1.2—2.5 cm. long. E.

C. fasciculatum Kell. (Brown Lady's-slipper)

PIPERIA

ORCHIS

Roots rounded or tuber-like; stem leafy-bracted. Leaves usually withering or dead at time of flowering. Flowers small, greenish-white, in a terminal spike. Sepals and petals 1—3-veined. Anther-cells parallel, opening at the side. Stigma a small beak between the anther-cells.

- A. Spur slightly longer than the lip. W. C. E. (*Habenaria unalaskensis*.)
P. unalaskensis Rydb.
- AA. Spur 2—3 times as long as the lip.
- B. Stem 3—7 dm. high; leaves withering at flowering time; spike lax or dense, 10—30 cm. long; upper sepals lanceolate. W. C. E. (*Habenaria elegans*; *P. leptosepala*; *P. multiflora*.)
P. elegans Rydb.
- BB. Stem 2—3 dm. high; leaves withering before flowering time; spike dense, short, 4—10 cm. long; upper sepals ovate. W. (*Habenaria michaeli*.)
P. michaeli Rydb.

LIMNORCHIS

ORCHIS

Roots fusiform, tuber-like; stem leafy. Leaves persisting until fruit is mature. Flowers small, greenish or white, in a terminal spike. Sepals and petals 3—7-veined, free, spreading; lip entire. Anther-cells nearly parallel, opening in front; glands naked. Stigma-beak without appendages. (Gk. *limne*=swamp or pool, *orchis*=the old Greek name of some of these plants.)

- A. Flowers green or purplish.
- B. Spur only $1/3$ — $1/2$ as long as the tip; lip linear; spike long, 1—3 dm., not dense; flowers purplish. W. C. E. (*Habenaria gracilis*; *Habenaria stricta*.)
L. stricta Rydb.
- BB. Spur equaling or exceeding the lip; lip lanceolate; spike short, dense; flowers green. C. E. (*Habenaria hyperborea*; *L. hyperborea*.)
L. viridiflora Rydb.
- AA. Flowers white or whitish.
- C. Lip linear; spike not dense.
- D. Lower leaves oblanceolate, obtuse; upper leaves lanceolate, acute; lateral sepals lanceolate, acute; lip 6—8 mm. long. C. E. (*Habenaria sparsiflora*; *L. laxiflora*.)
L. sparsiflora Rydb.
- DD. Leaves all linear to linear-lanceolate, acute to acuminate; lateral sepals ovate, acuminate; lip 12 mm. long. U. (*Habenaria aggregata*.)
L. aggregata (How.)
- CC. Lip lanceolate; spike lax or dense.
- E. Spur shorter than the lip or very little longer; flowers 12—14 mm. long. W. C. E. (*Habenaria dilatata*; *L. borealis*.)
L. dilatata Rydb.
- EE. Spur $1/3$ — $1/2$ longer than the lip; flowers 15—20 mm. long. W. C. E. (*Habenaria leucostachys*; *L. leucostachys robusta*.)
L. leucostachys Rydb.

LYSIAS

Leaves 2, basal; in ours flat on the ground, orbicular; green above, silvery beneath, 1—2 dm. wide. Flowers in a raceme, greenish-white (ours), comparatively large, irregular, spurred. Upper sepal rounded, short; lateral sepals spreading, falcate-ovate. Lip longer than the petals, entire. Anther-cells converging above; pollen-masses 2. Capsule ovoid. (Gk. *lysis*=a loosening. Why?) W. C. E. (*Habenaria orbiculata*.)
L. orbiculata Rydb.

CEPHALANTHERA

Rhizomes creeping; stem usually leafy (not in ours). Leaves none (ours) or flat. Flowers medium-sized, in a spike; spike terminal, bracted. Sepals and petals nearly equal. Petals somewhat united and galeate; lip free, concave, contracted and somewhat jointed in the middle. Column slender, elongated; anther with short filament so as to be nearly or quite above the level of the top of the stigmas; pollen-masses not connected nor attached to a gland. Stigma wholly beakless. (Gk. *cephaln*=a head, *anthera*=anther.) C. E. (*C. oregana*.) *C. austinae* Hel. (Snow Orchid)

EPIPACTIS

Rhizome horizontal, creeping, somewhat fleshy; roots thick-fibrous; stem leafy. Leaves dark-green or reticulately white-veined. Flowers white, in a raceme; raceme terminal, scapose, glandular-downy. Lip saccate, sessile, entire, without protuberances at base; tip straight or recurved. Upper sepal and the petals united into a hood over the lip. Anthers on the back of the short column; pollen-masses 2, the narrow gland to which they are attached held between the forked or 2-toothed beak which terminates the column. W. E. (The Greek name.)

E. gigantea Dougl. (Helleborine)

PERAMIUM (Goodyeara) RATTLE-SNAKE PLANTAIN

Rhizome horizontal, creeping, fleshy; roots thick-fibrous. Leaves all basal, thickish, petioled, white-reticulate. Scapes 1—4 dm. high. Flowers in a bracted spike. Lip saccate, entire, without protuberances at base, free from the column. Lateral sepals free; upper sepals and petals united into a hood over the lip. (L. *per*=thru, *amium*=love; on account of reputed medicinal properties.) W. C. E. (*Epipactis decipiens*; *P. mensiesii*.)

P. decipiens Pip.

SPIRANTHES (Ibidium, Gyrostachys) LADIES' TRESSES

Erect; roots fleshy-fibrous or tuberous. Stem leafy. Flowers small, spurless, in a spike; spike terminal, more or less twisted. Perianth gaping, oblique on the ovary. Lateral sepals somewhat decurrent, the upper ones and the petals coherent. Lip sessile or nearly so; base embracing and adhering to the column, with a callous swelling at each side; summit dilated, spreading, undulate, usually entire. Column very short, oblique, terminating in a very short erect stipe, bearing the ovate stigma on the face; beak usually acuminate and at length bifid by the separation of the oblong and viscid glands. Anthers sessile or nearly so, behind and at the base of the stipe, mostly acuminate; pollen-masses 2, thin and powdery, becoming attached above the gland. In wet places. (Gk. *speira*=a coil, *anthos*=a flower; referring to the spirally twisted racemes.)

A. Perianth about 8 mm. long; lip much dilated at apex, basal swellings small. W. C. E. (*G. stricta*.) *S. romanzoffiana* Cham.

AA. Perianth about 6 mm. long; lip little dilated at apex, basal swellings large. W. C. E. *S. porrifolia* Lindl.

LISTERA (Ophrys)

TWAY-BLADE

Small; roots fibrous or sometimes fleshy; stem with a few scales at base. Leaves 2, nearly opposite, sessile, near the middle of the stem. Flowers in a terminal raceme, spurless, greenish or madder-purple. Sepals and petals nearly alike, spreading or reflexed,

free. Lip mostly drooping, longer than the sepals, 2-lobed or 2-cleft at summit. Anther without lid, erect, jointed to the column; pollen masses 2, powdery, united to a minute gland; column wingless. Stigma with a somewhat rounded beak. Capsule ovoid or obovoid. In dense damp woods. (Honor of M. Lister, an English naturalist.)

A. Raceme glabrous or nearly so; lip 2-cleft to about the middle, about 4—5 mm. long; column 0.5 mm. or less long. W. C. E.

L. cordata R. Br.

AA. Raceme densely glandular-pubescent; lip 2-lobed or merely retuse, the divisions less than $1/6$ the distance to the base; column 2—3 mm. long.

B. Leaves rounded to truncate at base; petals 3—4 mm. long; lip 5 mm. long; capsule ovoid. W. C. *L. caurina* Phip.

BB. Leaves cordate to reniform at base; petals 4—6 mm. long; lip 9 mm. long; capsule obovoid. C. E. *L. convallarioides* Torr.

CORALLORHIZA

CORAL-ROOT

Saprophytes or root-parasites; roots coral-like, branched; stems scapose, simple. Leaves sheath-like, membranous, white to red, without green. Flowers in a terminal raceme, more or less showy. Lateral sepals united at the base with the foot of the column, forming a short spur or gibbous protuberance; outer sepals free; spur adnate to the summit of the ovary. Petals about as long as the sepals, 1—3-veined; lip 1—3-ridged; column nearly free, slightly incurved, somewhat 2-winged. Anthers terminal, with lid; pollen-masses 4, in 2 pairs, oblique, free, soft-waxy. In dense woods. (Gk. koralion=coral, riza=a root; on account of the knotted, fungus-covered roots.)

A. Sepals and petals 6—8 mm. long; lip mostly with teeth or lobes at or near the base; spur present.

B. Sepals and petals 3-veined; spur prominent; capsule oblong-cylindric.

C. Lip crenulate, with 2 lobes at base; spur wholly adnate to the ovary. W. C. E. (*C. multiflora occidentalis*.)

C. multiflora Nutt.

CC. Lip not crenulate, with or without 2 lobes or teeth at the base; spur free for its apical half. W. C.

C. mertensiana Bong.

BB. Sepals and petals 1-veined; spur very short, wholly adnate to the ovary; lip 2-toothed or 2-lobed above the base; capsule oblong-elliptical. E. (*C. innata*.)

C. corallorhiza Karst.

AA. Sepals and petals 12—17 mm. long, 3-veined; lip without teeth or lobes; spur none; capsules oblong-elliptic. W. E.

C. striata Lindl.

LIPARIS

Low; with solid bulbs. Stem with several sheathing scales at base. Leaves 2, wide, shining, basal. Flowers in a terminal raceme. Sepals and petals (other than the lip) nearly equal in length; sepals oblong-lanceolate, spreading. Petals filiform or linear; lip 3-lobed (ours), entire, nearly flat, often bearing 2 tubercles above the base. Column elongated, 2—3 mm. long, incurved, stout at base, with narrow wings above; pollen-masses 4, 2 in each sac of the anther, smooth, waxy, without stalk or gland, the pairs slightly united. (Gk. liparos=fat or shining; referring to the smooth leaves.) E. (*Leptorchis loeselii*.)

L. loeselii Rich. (Spurless Orchis)

CALYPSO (Cytherea)

Low, with solid bulbs; roots coral-like; stem scape-like, sheathed by 2—3 loose scales. Leaf 1, basal, round-ovate, petioled. Flower 1, large, showy, terminal. Perianth-segments (other than the lip) similar, nearly equal; lip large, saccate or swollen, 2-parted below. Column dilated, petal-like, oval, bearing the lid-like anthers just below the summit; pollen-masses 2, waxy, each 2-parted, the lower the smaller, sessile on a thick gland. W. E. ((Honor of the Greek goddess Calypso, who once held Ulysses captive.) (*C. occidentalis*; *C. borealis*.)

C. bulbosa Oakes (Calypso)

DICOTYLEDONS

SALICACEAE

Willow Family

Trees or shrubs; wood light; twigs brittle; bark bitter. Leaves simple, rarely lobed, alternate; stipules mostly present, often minute and caducous. Flowers of both sexes in aments, appearing with or before the leaves, dioicous, naked, 1 in the axil of each scale, subtended by a cup-like disk or by 1—2 tooth-like or gland-like projections. Stamens long, 1—many. Pistil 1; ovary sessile or short-stalked, 1-celled; placentae 2—4, style short and slender or none; stigmas 2, simple or 2—4-cleft. Fruit a capsule, 2—4-valved. Seeds many, small or minute, with a tuft of hairs at one end; hairs long, silky, mostly white.

A. Ament-scales entire; stamens 1—10; flowers with 1—2 gland-like projections at base; buds with only 1 bud-scale. SALIX (p. 117)

AA. Ament-scales lacerate or sharply serrate at tip; stamens 4—60; flowers with a cup-like disk at base; buds with more than 1 bud-scale. POPULUS (p. 122)

SALIX

WILLOW

Trees or shrubs; bud-scale 1. Leaves mostly narrow, short-petioled; stipules none or present, persistent or early deciduous. Ament-scales entire. Flowers with 1—2 gland-like projections at base. Staminate aments dense, erect to drooping; stamens 1—10 (mostly 2). Pistillate aments usually erect or spreading; ovary sessile or short-stalked; style short or filiform; stigmas 2, entire or 2-cleft. Capsule mostly 2-valved. (Celtic sal=near, lis=water; referring to the usual habitat.)

A. Ament-scales pale-yellow, deciduous.

B. Trees, with furrowed bark; leaves closely serrulate; stamens 2—9; style 0.3—0.5 mm. long.

C. Leaves without glands where petiole joins blade. AMYGDALINAE (p. 118)

CC. Leaves with glands where petiole joins blade. PENTANDRAE (p. 118)

BB. Shrubs or trees, with unfurrowed bark; leaves remotely serrulate or entire; stamens 2; style none. LONGIFOLIAE (p. 119)

AA. Ament-scales not pale-yellow, mostly brown to black, at least the tip darker, persistent.

D. Aments sessile, or their peduncles naked or merely with bracts.

E. Leaves glabrous beneath; stipules present; capsule glabrous.

CORDATAE (p. 119)

EE. Leaves either hairy beneath or else stipules none; capsule hairy.

F. Leaves densely silvery-hairy beneath; style elongated; capsule silvery-hairy.

ARGENTAE (p. 120)

- FF. Leaves often hairy beneath but not silvery-hairy; style short (except in PHYLICIFOLIAE); capsule pubescent or tomentose but not silvery-hairy.
- G. Leaves glabrous on both sides, margin not revolute; style 1—1.5 mm. long. PHYLICIFOLIAE (p. 121)
- GG. Leaves either hairy beneath or else margin revolute; style 0.0—0.3 mm. long.
- H. Tall shrubs, 3—15 m. high, not alpine; leaves 2.5—15 cm. long; aments stout, 2.5—7.5 cm. long; capsule 7—9 mm. long. CAPRAE (p. 121)
- HH. Low shrubs, less than 1 m. high, alpine; leaves 0.7—4.5 cm. long; aments not particularly stout, less than 2.5 cm. long; capsule 2.5—5 mm. long. RETICULATAE (p. 121)
- DD. Aments on leafy peduncles.
- I. Shrubs 1.5 m. or less high (except *S. lemmoni*, *S. barclayi*, and *S. macrostachya*); ament-scales wider than linear, obtuse or acute, brown or gray-brown or black, not reddish at tip; capsule-peduncle 2—5 mm. long.
- J. Stipules present, rather large on vigorous shoots (except *S. wolffii*); stigma entire. COMMUTATAE (p. 120)
- JJ. Stipules none or very small; stigma not entire. ARCTICAE (p. 120)
- II. Shrubs 2—5 m. high; ament-scales linear-oblong, acute, tawny, reddish at tip; capsule-peduncle 0.0—1.5 mm. long. ROSTRATAE (p. 121)

Subgenus AMYGDALINAE—Trees; bark brown; twigs long and slender, often drooping, gray or yellow. Leaves linear-lanceolate to broad-lanceolate; blade widest below its middle, acuminate, closely and finely serrulate, glabrous; stipules small and deciduous or none. Two kinds of aments appearing at the same time, slender, cylindric, terminal on leafy twigs. Scales deciduous, light-yellow, mostly glabrous outside, crisp-villous within. Stamens 2—9; filaments hairy below. Capsule small, glabrous, pedicellate; style 0—0.5 mm. long; stigma short. Along streams or in wet places.

- A. Leaves deep-green beneath when mature, narrowly lanceolate to linear-lanceolate; stipules semicordate; stamens 3—5. E.

S. nigra Marsh (Black Willow)

- AA. Leaves pale or glaucous beneath even when mature.

- B. Leaves narrowly lanceolate or linear-lanceolate; stipules narrow; twigs strikingly long and pendulous; stamens 2; cultivated. W. E.

S. babylonica L. (Weeping Willow)

- BB. Leaves lanceolate or broadly lanceolate; twigs not strikingly long; stamens 5—9.

- C. First few leaves at base of twigs plainly widest below the middle of the blade; stipules reniform; petioles slender, nearly terete. E.

S. amygdaloides Anders. (Peach Willow)

- CC. First few leaves at base of twigs mostly widest at or above the middle of the blade; stipules ovate; petioles wide, plainly grooved. W. C. E. (*S. congesta*; *S. laevigata congesta*.)

S. laevigata Bebb (Smooth Willow)

Subgenus PENTANDRAE—Tall shrubs or trees (ours); bark reddish-brown; twigs and buds olive or reddish-brown or yellowish, shining. Leaves large, lanceolate or elliptical, acute to acuminate, closely glandular-serrate specially near the base, glabrous; petiole glandular near where it joins the blade (ours) or naked; stipules small or none. Aments stout, dense, oblong, on short lateral leafy twigs; scales pale-yellow, deciduous, thinly pilose at base. Stamens 5—8 (ours). Capsule 5—9 mm. long, glabrous; pedi-

cel 1—2 mm. long; style about 0.5 mm. long; stigma short, notched or bifid. W. C. E. (*S. fendleriana*; *S. lasiandra lyallii*; *S. lasiandra caudata*.)

S. lasiandra Benth. (Gland Willow)

Subgenus LONGIFOLIAE—Shrubs or trees; stems gray to light brown; twigs slender, brown to reddish, often shining. Leaves linear to linear-lanceolate or narrowly elliptical, remotely denticulate or entire; petiole very short or none; stipules present or none. Aments terminating lateral leafy branches, the staminate often and the pistillate occasionally in 2's or 3's; scales light-yellow, deciduous. Stamens 2; filaments hairy below. Capsule glabrous to thinly villous, 4—7 mm. long; style none; stigma short (ours), bifid.

A. Leaves linear or linear-lanceolate; blade widest below the middle, entire or remotely denticulate; pistillate aments 10—20 mm. wide.

B. Leaves canescent or silky at least beneath; pedicel of capsule 0—0.7 mm. long.

C. Stigma short and thick; stipules none; twigs glabrous.

D. Capsule glabrous; leaves canescent on both surfaces or silky-tomentose beneath, rarely on both sides on very vigorous shoots. W. E.

S. exigua Nutt.

DD. Capsule pubescent; leaves appressed-silky on both sides. E.

S. argophylla Nutt. (Spotted Willow)

CC. Stigma long and slender; stipules present, acute, deciduous; twigs hoary-pubescent. W. *S. sessilifolia* Nutt. (Silver-leaf Willow)

BB. Leaves glabrous on both sides; pedicel of capsule 0.5—1.5 mm. long. E. (*S. fluviatilis tenerrima*; *S. longifolia tenerrima*.)

S. fluviatilis Nutt. (Sand-bar Willow)

AA. Leaves elliptical to oblanceolate; blade widest at or above the middle, rather closely denticulate; pistillate aments 7—8 mm. wide. W. E.

S. melanopsis Nutt. (Dusky Willow)

Subgenus CORDATAE—Shrubs, 2—5 m. high; stems densely caespitose; twigs brown to yellow, mostly slender, shining. Leaves linear-lanceolate to ovate or broadly oblanceolate, rounded to long-acuminate; stipules glabrous or hairy beneath; buds and slender petioles yellowish. Aments appearing before or with the leaves, rather slender, subsessile or on short bracted peduncles; scales tawny to fuscous. Capsule glabrous, pedicel; style present.

A. Leaves glaucous, or at least distinctly pale beneath.

B. Most of the leaf-blades widest below the middle. W. E. (*S. cordata angustata*; *S. cordata watsonii*; *S. lutea*.)

S. cordata Muhl. (Heart Willow)

BB. Most of the leaf-blades widest above the middle.

C. Bracts below the ament oblanceolate; scales long-hairy, obtuse or rounded. W. E. *S. piperi* Bebb

CC. Bracts below the ament lanceolate; scales glabrous, acute. E. (*S. cordata mackenziana*.) *S. mackenziana* Barr.

AA. Leaves deep-green on both sides, never pale beneath.

D. Leaves elliptic-oblong to oblong; ament-peduncles 1—2 mm. long; stipules ovate to lanceolate. E. *S. pseudomyrsinites* Anders.

DD. Leaves ovate to obovate; ament-peduncles 2.5—4 mm. long; stipules lunate to broadly ovate. E. *S. pyrifolia* Anders. (Pear Willow)

Subgenus COMMUTATAE—Shrubs, rarely tree-like, about 1—5 m. high; twigs dark-brown, shining or hairy. Leaves lanceolate to oblanceolate, entire or shallowly serrulate, densely to thinly tomentose at least above; stipules present or none. Aments on leafy peduncles (ours), appearing with or before the leaves; scales fuscous or black, wide, obtuse, villous. Capsule ovate or rostrate, glabrous or tomentose; pedicels 0.5—1.5 mm. long; style 0.5—1.5 mm. long.

A. Leaves lanceolate; scales of aments black. E.

S. lemmoni Bebb

AA. Leaves either ovate-lanceolate or else widest at or above the middle of the blade; scales of aments not black.

B. Leaves glabrate above, glabrous and glaucous beneath, crenate or serrulate. W.

C. E. *S. barclayi* Anders. (Barclay Willow)

BB. Leaves quite hairy on both sides, not glaucous beneath.

C. Stipules large, ovate. W. C. E. (*S. commutata mixta*; *S. commutata denudata*.)
S. commutata Bebb

CC. Stipules small or none.

D. Twigs ash-colored, hairy; pistillate aments 2.5—5 cm. long. E.

S. macrostachya Nutt

DD. Twigs yellow-brown, glabrous; pistillate aments 1—2.5 cm. long. C. E.
(*S. glauca villosa* for our region.)

S. wolfii idahoensis Ball

Subgenus ARCTICAE—Shrubs, erect or creeping, alpine or bog plants, 1—15 dm. high (except *S. myrtilloides* which may reach 4 m.); branches full of leaf-scars. Leaves small or medium, narrowly elliptical to oblanceolate, occasionally wider, entire, more or less tomentose or glabrous; stipules small or none. Aments appearing with the leaves, on short leafy peduncles; scales brown or brown-tipped, villous. Capsule sessile or short-stalked, gray- or white-tomentose; styles 1—1.5 mm. long; stigmas notched.

A. Erect shrubs, bog plants, alpine or low-land, 4 dm. or less high; mature leaves mostly 3—6 cm. long. W. C. E. (Apparently *S. glaucops*.)

S. myrtilloides L. (Bog Willow)

AA. Depressed or creeping shrubs, rock plants, alpine, less than 1 dm. high; mature leaves mostly 1—3 cm. long.

B. Leaves 2—4 cm. long, pale beneath, broadly elliptical to obovate. E.

S. petrophila Rydb. (Rock Willow)

BB. Leaves 1—1.2 cm. long, deep-green or slightly pale beneath, narrowly elliptical to obovate. C. *S. tenera* Anders. (Small-leaved Willow)

Subgenus ARGENTAE—Shrubs, 1—12 m. high; twigs rather long, brownish or yellowish, often lustrous, mostly pruinose. Leaves narrowly oblong or oblanceolate, acute, entire or subentire, densely silvery-hairy beneath. Aments sessile or very short-stalked, 1—5 cm. long. Stamens 1—2. Scales brown or black, hairy. Capsule small, silvery-hairy, sessile or short-stalked; style elongated.

A. Twigs densely covered with a bluish bloom, glabrous, brownish; stipules none or on vigorous shoots lanceolate. C. E.

S. subcoerulea Pip.

AA. Twigs not dense with bloom, either yellow or hairy; stipules none or on vigorous shoots lunate or reniform.

B. Stamens 2; twigs yellow, glabrous; staminate aments 1.2—2.5 cm. long, their scales acute. E. *S. bella* Pip.

BB. Stamen 1; twigs brownish, hairy; staminate aments 2.5—5 cm. long, their scales obtuse. W. C. E. *S. sitchensis* Sans. (Sitka Willow)

Subgenus PHYLICIFOLIAE—Shrubs, much branched, alpine or subalpine, 1—3 m. high; twigs short, divaricate, shining, brown. Leaves small, elliptic-ovate to obovate or oblanceolate, usually entire, bright-green and shining above, pale or subglaucous beneath, glabrous thruout or very thinly villous beneath with short silvery hairs. Aments sessile, stoutish, dense. Capsule sessile, gray-pubescent; style elongated; stigma thick. C. (*S. chlorophylla*.) *S. phylicifolia* L. (Tea-leaved Willow)

Subgenus CAPRAE—Tall shrubs or trees of wide distribution, 2—6 m. high; dark gray; twigs dark-brown to black. Leaves rather large, lanceolate oblong to obovate, entire to crenulate or crenulate-dentate, more or less pubescent to tomentose specially beneath, glabrate in age, dark-green above, glaucous beneath. Aments appearing before the leaves, stout, dense, sessile or subsessile; scales blackish, wide, long-villous. Capsule gray-pubescent or tomentose, long-beaked, 7—9 mm. long; pedicel 1—2.5 mm. long; style short or none; stigmas long, bifid.

A. Capsule pubescent; scales black. W. C. E. (*S. nuttallii*.)
S. scouleriana Barr. (Scouler Willow)

AA. Capsule tomentose; scales yellow. W.
S. hookeriana Barr. (Hooker Willow)

Subgenus ROSTRATAE—Shrubs, 2—5 m. high; twigs slender, divaricate, full of leaf scars. Leaves linear-oblanceolate to elliptical-oval, mostly entire, somewhat pubescent on both sides; stipules none or small. Staminate aments small, subsessile, with small leafy bracts at base; pistillate aments on pubescent leafy peduncles, rather lax in fruit; scales linear-oblong, acute, thinly pilose, tawny, reddish at tips. Capsule long-stalked, conic-rostrate, 5—10 mm. long, pubescent; style short or none; stigmas short, bifid.

A. Leaves elliptical-oval; peduncle of ament 2—5 mm. long; twigs without bloom. E.
(*S. rostrata*.) *S. bebbiana* Sarg. (Bebb Willow)

AA. Leaves linear-oblanceolate; peduncle of ament 1.5—2.5 mm. long; twigs with bloom. W. E. *S. geeyeriana* Anders. (Geyer Willow)

Subgenus RETICULATAE—Shrubs, low or creeping, densely caespitose, alpine, 5—90 cm. high. Leaves elliptic-oblong or obovate or suborbicular, strongly reticulate and glaucous beneath; petiole slender, channeled; stipules none. Aments on naked peduncles, arising opposite the last leaf. Capsule small, sessile, tomentose; style none; stigma short, bifid.

A. Stems ascending, 30—90 cm. high; leaves long-hairy beneath, 3—4.5 cm. long, 2—3.5 cm. wide, obscurely crenulate; aments 3—3.5 cm. long. E.
S. vestita Pursh

AA. Stems creeping, 3—10 cm. high; leaves glabrous beneath, 0.7—2.5 cm. long, 0.4—1.5 cm. wide, entire; aments 1—2 cm. long.

B. Leaves 15—25 mm. long, 10—15 mm. wide; aments 1—2 cm. long, many-flowered. C. *S. saximontana* Rydb.

BB. Leaves 7—12 mm. long, 4—8 mm. wide; aments 0.5—1 cm. long, 3—6-flowered. C. *S. nivalis* Hook.

POPULUS

POPLAR

Trees; bud-scales resinous. Leaves wide (ours) or narrow, usually long-petioled; stipules minute, fugaceous. Ament-scales fimbriate or incised. Disk cup-shaped, oblique, lobed or entire. Staminate aments dense, pendulous: stamens 6—40. Pistillate aments sometimes raceme-like, erect to pendulous: ovary sessile; style short; stigmas 2—4, entire or 4-lobed. Capsule 2—4-valved. Seed-hairs often very long and conspicuous. (L. *populus*=the common people; these were planted in public places by the Romans.)

A. Petiole strongly flattened laterally.

B. Tree not strikingly narrow for its height; branches spreading, their angle with the stem more than 45° ; leaves ovate to suborbicular, short-pointed. W. E.

P. tremuloides Michx. (Aspen)

BB. Tree strikingly narrow for its height; branches nearly erect, their angle with the stem less than 45° ; leaves broadly deltoid, abruptly acuminate. W. E. (*P. dilatata*.)

P. nigra italica DuRoi (Lombardy Poplar)

AA. Petiole terete or channeled, scarcely or not at all flattened laterally.

C. Leaves persistently and densely white-tomentose beneath, 3—5-lobed or irregularly dentate. W. *P. alba* L. (Silver-leaf Poplar)

CC. Leaves glabrous or nearly so when mature, crenate or crenulate.

D. Petiole 2.5—5 cm. long; leaves mostly ovate-lanceolate, rounded or subcordate at base; capsule 3-valved. W. E.

P. trichocarpa T. & G. (Cottonwood)

DD. Petiole 0.6—1.3 cm. long; leaves mostly lanceolate, rounded or obtuse at base; capsule 2-valved. E.

P. angustifolia Jas. (Narrow-leaved Cottonwood)

MYRICACEAE

Sweet Gale Family

Shrubs or trees. Leaves alternate, simple, resinous-dotted. Flowers in aments, monoicous or dioicous, naked, only 1 in the axil of each scale. Stamens 2—16, on the receptacle; filaments short, distinct or somewhat united; anthers ovate, 2-celled. Ovary 1-celled, subtended by 2—8 branchlets; style very short; stigmas 2, linear. Fruit a small drupelet (ours) or a nut. Seed 1.

MYRICA

Shrubs or small trees. Leaves oblanceolate (ours), entire or dentate (ours) or lobed, pinnately veined. Staminate aments oblong or nearly cylindric, expanding before or with the leaves: stamens 4—8. Pistillate aments ovoid or subglobose: ovary subtended by 2—4 bractlets. Fruit a drupelet, globose or ovoid, waxy. (Gk. *myrikn*=the name of the Tamarisk.)

A. Shrub, 0.3—2 m. high; leaves deciduous, 2—5 cm. long; staminate aments 12—21 mm. long. W. *M. gale* L. (Sweet Gale)

AA. Tree, 3—6 m. high; leaves evergreen, 5—10 cm. long; staminate aments 6—10 mm. long. W. *M. californica* Cham. (Wax-myrtle)

BETULACEAE

Birch Family

Shrubs or trees. Leaves alternate, petioled, simple, pinnately veined; stipules fugaceous. Flowers monoicous, rarely dioicous, in aments or head-like clusters; staminate aments pendulous; pistillate aments erect to drooping, spike-like or head-like or bud-like. Staminate flowers 1—3 in the axil of each scale: perianth 2—4-parted or -toothed, membranous or none: stamens 2—10, on the receptacle; filaments distinct. Pistillate

flowers 1—4 in the axil of each scale; perianth adherent to the ovary or none; ovary 1—2-celled; style 2-cleft or -divided; cells 1-ovuled. Fruit a nut or samara, flat or ovoid-globose, mostly 1-celled and 1-seeded.

A. Leaves densely stiff-hairy making them velvety to the touch; pistillate inflorescence bud-like, 5—10 mm. long; fruit a nut, 1 cm. or more in diameter, solitary or 2—3 in a group, each enclosed in a leafy involucre; shrub. CORYLUS (p. 123)

AA. Leaves not densely stiff-hairy nor velvety to the touch; pistillate inflorescence ament-like or cone-like; fruits small, many grouped together in cones or aments, without involucre; shrubs or trees.

B. Bark often cracking in the direction of the tree-circumference; lenticels elongated in the direction of the tree-circumference; winter buds covered by imbricate scales; stamens 2, bifid; pistillate aments solitary; scales of pistillate aments thin, 3-lobed, deciduous soon after the nutlets. BETULA (p. 123)

BB. Bark cracking up and down the tree or not at all; lenticels not elongated in the direction of the tree-circumference; winter buds enclosed by 2 scales; stamens 4, not bifid; pistillate aments or cones racemose; scales of pistillate aments or cones thick, entire or erose or 5-toothed, persistent, becoming woody.

ALNUS (p. 124)

CORYLUS

HAZEL

Shrubs (ours) or small trees. Leaves wide, serrate or incised. Flowers subtended by scales, monoicous (ours). Staminate flowers 1 to each scale: perianth none: stamens 4; filaments forked, each fork bearing 1 cell of an anther, the united part adherent to the scale. Pistillate flowers in clusters, 2 to each scale, each with a pair of bractlets which enlarge and enclose the nut at maturity; clusters small, oval, bud-like, not pendulous: perianth slightly projecting at tip of ovary: style short; stigma elongated. Fruit a nut, oblong or ovoid (ours), large, hard-shelled. (Gk. *korys*=a helmet; referring to the involucre.) W. C. E. (*C. rostrata* for our region.)

C. californica Rose

BETULA

BIRCH

Shrubs or trees; bark either smooth or cracking around the stem; buds scaly. Leaves serrate or dentate, sometimes also somewhat lobed. Flowers in aments; aments expanding before the leaves, scaly: staminate scales entire: pistillate aments erect or spreading; scales 3-lobed or entire, deciduous with the fruits. Flowers monoicous. Staminate flowers about 3 in the axil of each scale, subtended by 2 bractlets: perianth membranous, usually 4-toothed: stamens 2; filaments short, deeply 2-cleft, each fork bearing 1 anther-sac. Pistillate flowers 1—3 on each scale: perianth none: ovary sessile, 2-celled; styles 2, stigmatic at apex, mostly persistent. Fruit a nutlet or samara, small, flat, membranous-winged on each side, shorter than the scale. (The Latin name.)

A. Branchlets not or very little warty-glandular. W. C. E. (*B. piperi*.)

B. occidentalis Hook. (Western Birch)

AA. Branchlets very much warty-glandular.

B. Shrub or small tree, 3—12 m. high; leaves sparsely pubescent; body of the fruit much narrower than the wings. E. (*B. fontinalis*.)

B. microphylla Bunge (Rocky Mountain Birch)

BB. Shrub, 1—3 m. high; leaves glabrous; body of fruit as wide or wider than the wings. W. C. E. (*B. hallii*.)

B. glandulosa Michx. (Peat-bog Birch)

ALNUS

ALDER

Shrubs or trees; buds with 2 scales. Leaves dentate or serrate, sometimes also slightly lobed. Flowers monoicous, in aments; aments already starting during the previous season. Staminate aments fascicled, long-cylindric: flowers 3 or 6 on each scale: perianth mostly 4-parted: stamens 4; filaments short, not forked. Pistillate aments oval or elliptical, hardly pendulous, in racemes; scales woody at maturity, persistent, entire or erose or 5-toothed; flowers 2—4 on each scale: perianth none: ovary sessile, 2-celled; styles 2. Fruit small, wingless or winged, flat. (The Latin name.)

- A. Leaves doubly dentate or serrate, or more or less lobed and serrate; stamens 4.
- B. Teeth of leaves almost equilateral triangles; tip of tooth almost a right angle, often with a gland; leaves rusty-pubescent beneath at least on the veins; mature pistillate ament or cone 12—25 mm. long. W. C.
 - A. *oregona* Nutt. (Red Alder)
- BB. Teeth of leaves rather narrow; tip of tooth acuminate or narrowly acute, without gland; mature pistillate ament or cone 8—15 mm. long.
- C. Winter buds 12—13 mm. long, acuminate; leaves somewhat brown-hairy along the veins beneath; stipules oblong to spatulate, 6—7 mm. long; pistillate aments enclosed during the winter; flowers opening late, with or after the leaves. W. C. E. (*A. sitchensis*.)
 - A. *sinuata* Rydb. (Late Alder)
- CC. Winter buds 6—9 mm. long, obtuse; leaves without brown hairs; stipules ovate, 12—13 mm. long; pistillate aments naked during the winter; flowers opening early, before the leaves. C. E.
 - A. *tenuifolia* Nutt. (Mountain Alder)
- AA. Leaves simply serrulate, not at all lobed; stamens 1—3; mature pistillate ament or cone 8—13 mm. long. E. (*A. serrulata* for our region.)
 - A. *rhombifolia* Nutt. (White Alder)

FAGACEAE

Beech Family

Shrubs or trees. Leaves alternate, petioled, simple, pinnately veined, entire to lobed or cleft; stipules deciduous or none. Flowers monoicous, small. Staminate flowers in aments or heads: perianth 4—7-lobed: stamens 4—20; filaments slender, distinct, simple. Pistillate flowers solitary or in clusters, each cluster of 1 or more subtended by an involucre of wholly or partly united bracts which become a cup or bur: perianth 4—8-lobed, urn-shaped or oblong, adnate to the ovary: ovary 3—7-celled; ovules 1—2 in each cell; styles as many as the ovary cells, terminally or longitudinally stigmatic. Fruit 1—3 nuts. Seed 1.

- A. Leaves serrate or dentate or entire, not lobed; filaments many times as long as the anthers; pistillate flowers on the bases of the staminate aments.
- B. Leaves entire, coated beneath with yellow persistent scales; involucre enclosing 1—3 nuts, very prickly with branched prickles. CASTANOPSIS (p. 125)
- BB. Leaves entire or serrate or dentate, without scales beneath; nuts solitary; involucre covering only the base of the nut, not prickly or at least the prickles not branched. PASANIA (p. 125)
- AA. Leaves often deeply lobed but in some serrate or entire; filaments not longer than the anthers: pistillate flowers not on the staminate aments; fruit a single nut (acorn), partly enclosed in a scaly cup which is not prickly. QUERCUS (p. 125)

CASTANOPSIS

Shrubs or leaves. Leaves coriaceous, evergreen. Flowers monoicous, small. Staminate flowers in slender paniced lateral aments: pistillate flowers in clusters of 1—3 in a scaly involucre; cluster sessile, at base of staminate aments. Perianth of staminate flowers 5—6-lobed: stamens usually 10—12. Perianth of pistillate flowers 6-lobed, in 2 rows: ovary 3-celled; cells 2-ovuled; styles usually 3 (so in ours). Fruit a group of 1—3 nuts; involucre enclosing the nuts, subglobose, densely covered with stout branched prickles, at length bursting irregularly. C. E.

C. chrysophylla DC. (Chinquapin)

PASANIA

Trees; bark deeply furrowed, scaly. Leaves evergreen, entire to dentate; stipules present. Aments axillary, tomentose, scaly, erect; scales ovate, rounded. Staminate flowers 3 on each scale: perianth 5-lobed, tomentose; lobes triangular, acute: stamens 10; filaments elongated: ovary abortive, hairy. Pistillate flowers only at base of upper staminate aments, 1 on each scale: perianth 6-lobed; stamens 6, with abortive anthers: ovary 3-celled; styles 3, elongated, spreading. Fruit a nut, ovate or oval, maturing the second season; surrounded at base by a cup-like involucre; shell thick, tomentose inside.

(Perhaps from *L. pascere*=to feed; on account of the acorns.) W. (*Quercus densiflora*.)

P. densiflora Oerst. (Chestnut Oak)

QUERCUS

OAK

Shrubs or trees. Leaves entire to lobed or cleft, deciduous or evergreen. Staminate flowers in aments, 1 on each scale; aments slender, mostly drooping, many-flowered; bracts caducous: perianth mostly 6-lobed, campanulate: stamens 6—12: sometimes with evanescent pilose ovary. Pistillate flowers solitary: perianth adherent to the ovary: ovary usually 3-celled; styles as many as the ovary-cells, short, erect, incurved. Fruit a nut (acorn), oblong or ovoid or subglobose, subtended and somewhat enclosed at base by the involucre (cup); shell hard. (Celtic *quer*=fine, *cuez*=a tree; because the sacred Mistletoe grew upon it.)

A. Leaves not lobed, entire or sinuate or serrate or dentate, evergreen.

B. Leaf-blade widest above rather than below the middle; acorns maturing the first season, shell glabrous inside. W.

Q. sadleriana R. Br.

BB. Leaf-blade widest below rather than above the middle; acorns maturing the second season, shell hairy inside.

C. Shrub or small tree, 9 m. high or less; leaves 2.5—7.5 cm. long; petioles 6—7 mm. long; acorn-cup more or less hidden in yellow or gray-yellow tomentum.

W. C. *Q. chrysolepis* Leibm. (Live Oak)

CC. Shrubs, 2 m. high or less; leaves 1.2—3.8 cm. long; petioles 8—13 mm. long; acorn-cup not with hairs about it. C. E. (*Q. vaccinifolia*.)

Q. chrysolepis vaccinifolia Engelm. (Huckleberry Oak)

AA. Leaves lobed, deciduous.

D. Leaf-lobes mostly sharp-pointed; acorns maturing the second season, shell silky-tomentose on the inside; stamens 4—6. W. C. (*Q. kelloggii*.)

Q. californica Coop. (Black Oak)

DD. Leaf-lobes mostly with rounded tips; acorns maturing the first season, shell glabrous on the inside; stamens 5—10.

- E. Shrubs or trees, 45 m. high or less; notches of the leaf-blades rounded. W.
(*Q. jacobi*.) *Q. garryana* Dougl. (White Oak)
- EE. Shrubs, 2 m. high or less; notches of the leaf-blades mostly acute. W. C.
Q. oerstediana R. Br. (Scrub Oak)

ULMACEAE

Elm Family

Shrubs or trees. Leaves alternate, pinnately veined but often with 3—5 chief veins from the base, simple, serrate (ours) or entire, often unequal at base (so in ours); stipules usually fugacious (so in ours). Flowers in lateral or axillary clusters, or the pistillate flowers solitary, small, monoicous or dioicous or polygamous or perfect. Perianth 3—9-parted or of 3—9 distinct segments. Stamens as many as the perianth-segments and opposite them. Ovary 1-celled, rarely 2-celled, superior; styles or stigmas 2. Fruit a samara or drupe or nut. Seed 1.

- A. All flowers in clusters; fruit dry, winged, leaves with 1 vein from the base.
ULMUS (p. 126)

- AA. Pistillate flowers solitary; fruit a drupe; leaves with 3 chief veins from the base.
CELTIS (p. 126)

ULMUS

ELM

Trees. Leaves with strong straight veins from the mid-vein, with only 1 vein from the base, base somewhat heart-shaped; petiole short. Flowers purplish or yellowish, in lateral clusters, appearing before the leaves. Perianth campanulate, 4—9-cleft. Stamens 4—9. Pistil 1; ovary 1—2-celled; styles short. Fruit a samara. Seed 1. Cultivated. (The Latin name.) W. E.

U. americana L.

CELTIS

HACKBERRY

Shrubs or trees. Leaves serrate (ours) or entire, or in some species 3—5-veined from the base (so in ours). Flowers monoicous or dioicous (not ours) or polygamous. Staminate flowers in clusters; pistillate flowers solitary or 2—3 together; both kinds of clusters axillary. Perianth 4—6-parted, or of 4—6 separate segments. Stigmas recurved or divergent, tomentose or plumose. Fruit a drupe, ovoid or globose. Seed-coat membranous. (The Latin name of an African Lotus on account of resemblances in fruit.) E. (*C. occidentalis* and *C. reticulata* for our region.)

C. douglasii Planch.

MORACEAE

Mulberry Family

Herbs or shrubs or trees; juice milky or watery. Leaves alternate or opposite, petioled; stipules present. Flowers monoicous or dioicous; staminate flowers in panicles or spikes; pistillate flowers in spikes or head or cymes, sometimes flowers solitary; both kinds of clusters axillary. Perianth 4—5-parted. Stamens as many as the perianth-segments. Ovary superior, 1-celled (ours); styles 1—2. Fruit various, in ours either cone-like or blackberry-like. Seed 1.

- A. Shrubs or trees; sap milky; leaves alternate; stipules fugacious; fruit a berry.
MORUS (p. 127)

- AA. Twining herbs; sap watery; leaves opposite; stipules persistent; fruit cone-like.
HUMULUS (p. 127)

MORUS

MULBERRY

Shrubs or trees; juice milky. Leaves alternate, dentate, often lobed, 3-veined from the base; stipules fugacious. Flowers in ament-like spikes, small, monoicous or dioicous. Perianth of staminate flowers 4-parted; segments somewhat imbricated: stamens 4. Perianth of pistillate flowers 4-parted, persistent, becoming fleshy in fruit, enclosing the ripe ovary: ovary sessile; stigmas 2, linear, spreading. Fruit an aggregate, blackberry-like (ours), comprising the whole pistillate spike; each fruitlet with an outer fleshy part and an inner stone-like part. Planted but somewhat escaped. (The Latin name.) E.

M. rubra L. (Red Mulberry)

HUMULUS

HOP

Herbaceous vines, rough, twining, perennial; juice watery. Leaves opposite, thin, palmately veined, serrate, 3—7-lobed or not lobed; stipules persistent, lanceolate, membranous. Flowers dioicous. Staminate flowers in loose axillary clusters: perianth 5-parted; segments imbricate: stamens 5. Pistillate flowers in drooping ament-like spikes, 2 in the axil of each ament-bract: perianth membranous, entire, clasping the ovary: stigmas 2, filiform, caducous. Fruit cone-like; bracts persistent, subtending the flat ovate akenes. Cultivated but much escaped. (Diminutive of L. humus—the ground; because prostrate in the absence of support.) W. E.

H. lupulus L. (Cultivated Hop)

URTICACEAE

Nettle Family

Herbs (ours) or shrubs or trees; juice watery. Leaves alternate or opposite, simple; *pinnately veined but sometimes with several chief veins from the base* (so in ours); stipules present or none; petioles present (ours). Flowers monoicous or dioicous or polygamous, small, greenish, variously arranged but the clusters axillary. Perianth 2—5-cleft or -parted, or of 2—5 distinct segments; segments similar. Stamens as many as the segments or lobes of the perianth, opposite them. Ovary superior, 1-celled; style 1; stigma capitate and brush-like or filiform. Fruit an *akene*. Seed 1.

A. Perennial; herbage with stinging hairs; leaves opposite, coarsely serrulate; stipules present; flowers not involucre. URTICA (p. 127)

AA. Annual; herbage without stinging hairs; leaves alternate, entire; stipules none; flowers involucre by leafy bracts. PARIETARIA (p. 128)

URTICA

NETTLE

Herbs, annual or perennial (ours); hairs stinging. Stems 4-angled, sulcate. Leaves opposite, coarsely serrate (ours), 3—7-veined from the base; stipules present. Flowers small; clusters paired, racemes or spikes or heads, bractless. Staminate flowers on jointed pedicels: perianth 4-parted: stamens 4: rudimentary cup-shaped ovary present. Perianth of the pistillate flowers 4-parted, the 2 outer parts smaller than the 2 inner: stigma sessile or nearly so. Fruit ovate or oblong, flat, enclosed by the inner perianth. (L. urere—to burn; referring to the sensation produced by the stinging hairs.)

A. Leaves soft-pubescent on both sides; staminate flower clusters nearly equaling the leaves. E. U. holosericea Nutt. (Hairy Nettle)

AA. Leaves glabrous above or nearly so, sparsely pubescent beneath; staminate flower clusters hardly exceeding the petiole.

- B. Inner perianth-segments rather widest below their middle, in fruit shorter than the akene; akene 1—1.5 mm. long. W. C. E. (*U. gracilis* for our region.)
U. lyallii Wats. (Common Nettle)
- BB. Inner perianth-segments rather widest above their middle, in fruit about 3 times as long as the akene; akene 0.5—0.7 mm. long. W. C. E.
U. breweri Wats.

PARIETARIA

PELLITORY

Herbs, low, diffuse or tufted, annual (ours) or perennial; hairs not stinging. Leaves alternate, entire, 3-veined from the base; stipules none. Flowers polygamous; clusters head-like, involucre by leafy bracts. Perianth of staminate flowers 4-parted or of 3—4 distinct segments. Perianth of pistillate and perfect flowers tubular or campanulate, 4-lobed: style slender; stigma brush-like. Fruit enclosed by the withering but persistent perianth. In dry open places. (L. paries—a wall; because some species prefer to grow on old walls.)

- A. Leaves oblong-lanceolate; involucre 2—3 times as long as the flowers. E.
P. pennsylvanica Muhl.
- AA. Leaves ovate: involucre about equaling the flowers. W. E.
P. debilis Forst.

SANTALACEAE**Sandal-wood Family**

Herbs (ours) or shrubs or trees, *sometimes root-parasites*. Leaves entire, alternate (ours) or opposite; stipules none. Flowers clustered or solitary, axillary or terminal, perfect (ours) or monoicous or dioicous, mostly greenish. Perianth adnate to base of ovary or to disk, 3—6-lobed; lobes similar. Stamens as many as the perianth-lobes and opposite them, on the disk. Ovary 1-celled; ovules 2—4; placenta central; style 0—1; stigma capitate. Fruit a drupe (ours) or nut. Seed 1, ovoid or globose.

COMANDRA

COMANDRA

Perennial, erect, glabrous, mostly parasitic on the roots of other plants. Leaves alternate, simple, oblong or oval or lanceolate or linear, pinnately veined, almost sessile. Flower-clusters cymose, bractless. Perianth campanulate, its limb 4—5-lobed; tube lined above the ovary with an adherent disk which has a free 5-lobed border. Anthers attached to the calyx-lobes by a tuft of hairs each. (Gk. *komn*=hair, *andros*=a man, male; referring to the hairs attached to the anthers.)

- A. Leaves pallid, acute 3—7 mm. wide; flowers many, corymbosely clustered near the top of the stem; style slender.
- B. Leaves oblong, pale-green beneath; fruit globose, constricted above the line at which the perianth joins it. W. E.
C. umbellata Nutt.
- BB. Leaves linear or narrowly lanceolate, or those of the main stem oblong, glaucous beneath; fruit ovoid-oblong, constricted at the line at which the perianth joins it. E.
C. pallida DC. (Pale Comandra)
- AA. Leaves green, obtuse, 7—13 mm. wide; flowers few, on axillary peduncles; style short. E.
C. livida Rich. (Green Comandra)

LORANTHACEAE**Mistletoe Family**

Herbs or shrubs, green or yellowish- or olive- or brownish-green, *parasitic on woody plants*, a few terrestrial (not ours). Leaves opposite (ours), in some merely scales.

Flowers monoicous or dioicous (ours) or perfect, regular, terminal or axillary, clustered or solitary. *Perianth* of similar parts (ours) or calyx and corolla distinguishable; *tube adherent to the ovary*; limb entire or toothed or lobed. Stamens 2—6. Style 0—1; stigmas terminal, entire, obtuse. *Fruit* a berry. *Seed* 1.

A. Herbs, parasitic on branches of *Abies* or *Pseudotsuga* or *Tsuga* or *Larix* or *Pinus*; anthers 1-celled; berry stalked; inflorescence not bracted. RAZOUMOFSKYA (p. 129)

AA. Shrubs, parasitic on *Quercus* or *Juniperus* or *Libocedrus*; anthers 2-celled; berry sessile; inflorescence bracted. PHORADENDRON (p. 129)

RAZOUMOFSKYA (*Arceuthobium*) SMALL MISTLETOE

Herbs, perennial, parasitic on branches of conifers, fleshy, small or minute, glabrous; branches 4-angled. Leaves scale-like, opposite, connate. Flowers not bracted, solitary or several together in the axils of the scales; disk present. *Perianth* of staminate flowers 2—5-parted: stamens usually as many as the perianth-lobes and on them; anthers sessile. *Perianth* of pistillate flowers with 2-parted limb. Berry ovoid, somewhat flat. (Honor of A. Razoumofski, a Russian botanist.)

A. On *Pinus contorta* or *Pinus flexilis*; staminate plants 5—10 cm. high, 0.5—2 mm. thick at base; pistillate plants much smaller; staminate flowers dichotomously paniculate, nearly all terminal on peduncle-like joints. W. E.

R. americana Kuntze

AA. On trees other than those in A; staminate flowers nearly all axillary, forming simple or compound spikes.

B. On *Pinus ponderosa*; stems 5—13 cm. high, 4—5 mm. thick at base. W. (*R. robusta* for our region.) *R. campylopoda* Pip. (Snappers)

BB. On conifers other than *Pinus*; stems 0.8—4 cm. high.

C. On *Pseudotsuga taxifolia*. E.

R. douglasii Kuntze

CC. On *Tsuga heterophylla*. E.

R. douglasii tsugensis Pip.

CCC. On *Larix occidentalis*. E.

R. douglasii laricis Pip.

CCCC. On *Abies grandis* or *Abies concolor*. C. E. (*R. occidentalis abietina* for our region.) *R. douglasii abietina* Pip.

PHORADENDRON

MISTLETOE

Shrubs, parasitic on trees, yellowish-green or olive-green; twigs brittle, usually jointed. Leaves flat, coriaceous, entire or undulate, faintly veined. Flowers small, in bracted spikes, 1 to several to each bract. *Perianth* 2—4-lobed, globose or ovoid. Anther 1 at the base of each perianth-lobe, sessile, transversely 2-celled. Ovary inferior; style short; stigma obtuse or capitate. Berry ovoid or globose. (Gk. phor—a thief, dendron—a tree; because it is parasitic on trees.)

A. On oaks; even the younger branches terete; leaves orbicular to spatulate, 1.2—4.2 cm. long, not scales, not connate at base, permanently villous; berry white. W.

P. villosum Nutt. (Oak Mistletoe)

AA. On conifers; younger branches 4-angled; leaves broadly triangular, scales, often connate at base, ciliate; berry white or red.

B. On junipers (*Juniperus*). E.

P. juniperinum Engelm. (Juniper Mistletoe)

BB. On Incense Cedar (*Libocedrus decurrens*). W. (*P. libocedri*.)

P. juniperinum libocedri Engelm. (Incense Mistletoe)

ARISTOLOCHIACEAE

Birthwort Family

Herbs (ours) or shrubs, acaulescent or with stem-like rhizome only (ours), or with erect or twining stems. *Leaves* alternate (ours) or basal, petioled, mostly *cordate* or *reniform* (so in ours); stipules none. *Flowers* axillary or terminal, solitary (ours) or clustered, *perfect*, mostly large, regular (ours) or irregular. Perianth adherent to the ovary at least below; 3-lobed (ours) or 6-lobed or irregular. Stamens 6 to many, on the ovary. *Ovary wholly or partly inferior*. *Fruit a capsule, mostly 6-celled* (so in ours). *Seeds many*, ovoid or oblong, angled or flat, smooth or wrinkled.

ASARUM

WILD GINGER

Rhizome ginger-like to taste, bearing several scales and 1—2 leaves; roots thick, fibrous-fleshy. Leaves entire, evergreen (ours); petioles very long. Flowers brown-purple or mottled, on long peduncles, on or very near the ground. Perianth campanulate or hemispheric. Stamens 12. Placentae parietal, intruded. Fruit coriaceous, subglobose or hemispheric, dehiscent longitudinally or bursting irregularly. Seed flat. In damp forests. (Said to be from Gk. *a*=not, *seiro*=to bind; because it withers too easily to use for garlands.)

A. Leaves not marked with white; free tip of connective much shorter than the anther; ovary about 8 mm. wide; seed 3 mm. long. W. C. E.

A. caudatum Lindl.

AA. Leaves marked with white above; free tip of connective 1—2 times as long as the anther; ovary about 12 mm. wide; seed 4 mm. long. W.

A. hertwigi Wats. (Mottled Wild Ginger)

POLYGONACEAE

Buckwheat Family

Herbs or herbaceous twining vines or shrubs or trees (not ours); juice watery, often acid or acrid. Stems jointed when sufficiently elongated. Leaves alternate or opposite or whorled, simple, mostly entire; *stipules sheathing, united*, or none. Inflorescence various. Flowers regular, perfect or monoicous or dioicous or polygamous. Perianth 2—6-cleft or -parted; segments more or less imbricated, often petal-like, sometimes winged in fruit. Stamens 2—9; filaments distinct (ours) or united into a ring. *Ovary superior*, 1-celled; ovule 1; style 2—4-cleft or -parted; stigmas capitate or tufted or 2-cleft. Fruit an *akene*, *lens-shaped* or 3-angled or rarely 4-angled, usually enclosed in the persistent perianth.

A. Lower leaves fan-shaped, 2-lobed, distinctly toothed, 4—13 mm. long; all leaves opposite, scattered along the stem. PTEROSTEGIA (p. 131)

AA. Leaves never fan-shaped, not lobed, rarely faintly serrulate, often more than 13 mm. long, alternate or whorled in almost all species, often in basal tufts.

B. Stipules none; flowers involucrate; juice nearly tasteless; styles 3; stamens 9.

C. Involucre 1-flowered, coriaceous; its teeth cuspidate, often hooked; annual. CHORIZANTHE (p. 131)

CC. Involucre several-flowered, either herbaceous or without sharp point to its teeth.

D. Akene lens-shaped; involucre 3—4-lobed, shortly awned; annual.

OXYTHECA (p. 131)

DD. Akene 3-angled; involucre 4—8-lobed, pointless; annual or perennial.

ERIOGONUM (p. 132)

- BB. Stipules scarious and sheathing; flowers not involucrate; juice usually sour or acrid; styles 2—3; stamens fewer than 9 (except sometimes in *Polygonum*).
- E. Leaves kidney-shaped, wider than long; akene orbicular and broadly winged; perianth-lobes 4; stigmas 2. OXYRIA (p. 136)
- EE. Leaves not kidney-shaped, longer than wide; akene 3-angled or lens-shaped, not winged; perianth-lobes 5—6 (4 in a few); stigmas 2—3.
- F. Perianth-lobes 6, outer smaller and reflexed, inner erect and enlarging in fruit (except *R. acetosella* with very sour leaves); stigmas 3, tufted; akene 3-angled. RUMEX (p. 134)
- FF. Perianth-lobes 5, rarely 4 or 6, all about equal and remaining so; stigmas 2—3; capitate; akene 3-angled or lens-shaped.
- G. Plants not vines; akene 3-angled or lens-shaped. POLYGONUM (p. 136)
- GG. Plants vines; akene 3-angled.
- H. Plants not fleshy; calyx exceeding the mature akene; surface of akene without pinnate striation; basal angles of leaves either projecting downward or else rounded. POLYGONUM (p. 136)
- HH. Plants rather fleshy; calyx only $\frac{1}{2}$ as long as the akene; mature akenes with pinnate striation on each face; basal angles of leaves pointed, the points projecting outward. FAGOPYRUM (p. 140)

PTEROSTEGIA

Herbs, annual. Stems slender, weak, diffusely and dichotomously branched. Leaves opposite; entire or 2-lobed. Flowers solitary, sessile, in the forks of branches, involucrate; involucre foliaceous, sessile, of 1 bract, shorter than the flower, rounded and more or less 2-lobed; old involucre enlarged, scarious, reticulate, loosely enveloping the akene, gibbously 2-saccate on the back. Perianth 5-parted; segments all alike. Stamens on base of perianth, 5 or fewer. Fruit 3-angled, glabrous. * (Gk. pteron=wing, stege=a covering; referring to the bract-like involucre enclosing the solitary flowers.) W.

P. drymarioides F. & M.

CHORIZANTHE

Herbs, annual (ours) or perennial, low. Stems dichotomously branched. Leaves mostly in a basal tuft. Flowers small, in heads, 1—3 in the involucre (1 in ours); heads small; involucre tubular or funnel-form, sessile, 2—6-angled or -veined, 2—6-toothed or -cleft, its divisions more or less divaricate and cusped or awned at tip. Perianth 6-parted or -cleft. Stamens 9, rarely 3 or 6, on base of perianth or adherent to it. Styles linear; stigmas capitate. Fruit 3-angled, beaked. (Probably Gk. chorion=a membrane, xanthos=yellow. Why?)

A. Plant 2.5—10 cm. high, branching from the base; stamens inserted at the throat of the perianth-tube. E. *C. watsoni* T. & G.

AA. Plant 15—45 cm. high, sparingly branched above; stamens inserted at the base of the perianth-tube. U. *E.C. membranacea* Benth.

OXYTHECA

Herbs, annual. Stems slender, repeatedly dichotomously branched. Leaves all in a basal tuft. Flowers in clusters of 1 to several, small, perfect, pedicelled; clusters involucrate; involucre more or less stalked, campanulate or turbinate, herbaceous, not reticulate, 3—5-cleft; involucre-lobes erect or spreading, mostly with a straight slender awn at tip. Pedicels more or less exserted, intermingled with bractlets. Perianth 6-parted, col-

ored. Fruit ovate, lens-shaped, enclosed in the perianth. (Gk. oxys=sharp, theke=case, sac; referring to the pointed anthers.) E.

O. dendroidea Nutt.

ERIOGONUM

ERIOGONUM

Herbs or shrubs or shrubby at base, annual or perennial. Stems leafy or none, simple or branched, often tufted. Leaves entire, alternate or opposite or whorled. Flowers in heads or umbels or cymes or fascicles; clusters involucre; involucre 4—8-toothed or -cleft, campanulate or top-shaped or almost cylindric. Perianth 6-cleft or -parted, usually colored; segments equal or the outer ones larger. Stamens 9, included or exserted; filaments filiform, often villous. Style 3-parted; stigmas capitate. Akene pyramidal, 3-angled, more or less swollen near the base, enclosed by the perianth-segments or winged. (Gk. erion=wool, gonu=knee; on account of the woolly and jointed stems.)

A. Involucre 5—6-veined, often angled.

B. Annual; leaves all basal, or rarely some on the nodes of the stems.

C. Leaves oblong; involucre 4 mm. long; plant sparingly branched, tomentose thruout. W. C. E. *virgatum* Benth.

CC. Leaves orbicular to broadly ovate; involucre 1—3 mm. long; plant diffusely branched, glabrous or somewhat tomentose thruout.

D. Involucre 3 mm. long. E.

E. *vimineum* Dougl.

DD. Involucre 1—1.5 mm. long. E.

E. *baileyi* Wats.

BB. Perennial; leaves mostly not basal, usually some on the nodes of the stem.

E. Perianth-segments all very similar and nearly equal.

F. Herbs.

G. Peduncles not fistulous, slender. E.

E. *strictum* Benth.

GG. Peduncles fistulous, stout.

H. Peduncles 2.5—15 cm. high; heads solitary.

I. Perianth-segments ovate; leaves linear-oblongate, glabrate above.

E. E. *pauciflorum* Pursh

II. Perianth-segments cuneate; leaves spatulate or oblongate, white-tomentose on both sides. E.

E. *multiceps* Nees

HH. Peduncles 30—120 cm. high; heads solitary or few.

J. Leaves acute, 5—15 cm. long; involucre tomentose; flowers white or rose. E. E. *elatum* Dougl.

JJ. Leaves obtuse, 1—5 cm. long; involucre glabrate; flowers yellow or reddish. E.

E. *nudum* Dougl.

FF. Shrubs, or shrubby below.

K. Flowers yellow. E.

E. *campanulatum* Nutt.

KK. Flowers not yellow.

L. Styles and stamens included. E. (*E. microthecum*.)

E. *effusum* Nutt.

LL. Styles exserted. E.

E. *corymbosum* Benth.

EE. Outer perianth-segments wider than the inner.

M. Umbel simple.

- N. Bracts foliaceous, not all ternate but varying from 2—5. E.
E. latum Small
- NN. Bracts not foliaceous, ternate. W. C. E. (*E. ovalifolium purpureum*; *E. ovalifolium celsum*; *E. ovalifolium vinum*; *E. vinum*; *E. orthocaulon*; *E. ochroleucum*).
E. ovalifolium Nutt.
- MM. Umbel compound.
- O. Involucres in clusters; flowers white or yellow or purple. E. (*E. ovalifolium proliferum*).
E. proliferum T. & G.
- OO. Involucres scattered, mostly solitary; flowers white.
- P. Plants erect or ascending. E. (*E. dichotomum*).
E. niveum Dougl.
- PP. Plants decumbent. E.
E. decumbens Benth.
- AA. Involucre veinless, not angled.
- Q. Annual; bracts not foliaceous, ternate, small, mostly triangular and rigid.
- R. Leaves all basal; involucre and flower about 1 mm. long. E.
E. cernuum Nutt. (Nodding Eriogonum)
- RR. Leaves not all basal; involucre and flower 1—3 mm. long.
- S. Stem 1—3 dm. high, branching from the base. E.
E. angulosum Benth.
- SS. Stem 3—9 dm. high, simple except the inflorescence. E.
E. annuum Nutt.
- QQ. Perennial; bracts foliaceous, not all ternate but varying from 2—8.
- T. Flowers not contracted to a stipe-like base; akene densely villous.
- U. Plant 3—6 dm. high; leaves scattered along the stem, margins not revolute. E.
E. pendulum Wats.
- UU. Plant 1 dm. or less high (reaching 3 dm. in *E. flavum*); leaves crowded on the much-branched woody base.
- V. Leaf margin not revolute. C. E.
E. flavum Nutt.
- VV. Leaf margin revolute.
- W. Plant tomentose; leaves oblong to linear; involucres in heads of 1—5.
E. *E. acaule* Nutt.
- WW. Plant canescent; leaves spatulate; involucres solitary. E.
E. minimum Small
- TT. Flowers contracted to a stipe-like narrow base; akene glabrous or nearly so.
- X. Perianth pubescent.
- Y. Lobes of the involucre reflexed.
- Z. Erect, much-branched; leaves often revolute.
- a. Plant 15—25 cm. high; leaves lanceolate or spatulate. E.
E. sphaerocephalum Dougl.
- aa. Plant 7—13 cm. high; leaves linear. E. (*E. tenue*).
E. sphaerocephalum tenue Pip.
- ZZ. Prostrate or nearly so, only the flowering stems erect; leaves not revolute.
- b. Leaves 4—13 mm. long, densely white-tomentose on both sides; peduncles 2.5—7.5 cm. long, naked. E.
E. caespitosum Nutt.
- bb. Leaves 12—30 mm. long, densely white tomentose below but pu-

- bescent above; peduncles 5—15 cm. long, with a whorl of leaves in the middle.
- c. Umbel simple. E.
E. douglasii Benth.
- cc. Umbel compound. E.
E. douglasii ramosum Pip.
- YY. Lobes of the involucre erect.
- d. Plants shrubby thruout; leaves linear, margin revolute; flowers pink to purplish. E. *E. thymoides* Benth.
- dd. Plants shrubby only at much-branched base; leaves wider than linear, margin not revolute.
- e. Plants 5—7.5 cm. high; flowers yellow; bracts 3—8. C. (*E. pyrolaefolium coryphaeum*).
E. pyrolaefolium Hook.
- ee. Plants 12—25 cm. high; flowers purplish; bracts 2. E. (*E. androsaceum* for our region.)
E. piperi Gr.
- XX. Perianth glabrous.
- f. Peduncle naked except for a whorl of leaves where the rays of the umbel arise.
- g. Umbel compound; leaves mostly cordate. W. C. E. (*E. compositum leianthum*.) *E. compositum* Dougl.
- gg. Umbel simple; leaves narrowed at base.
- h. Umbel 4-rayed; middle ray short and naked except for involucre, other 3 also with linear bracts. U.
E. ternatum How.
- hh. Umbel 3—10-rayed; rays naked except for involucre.
- i. Flowers distinctly yellow. E. (*E. umbellatum hypoleium*; *E. umbellatum intectum*).
E. umbellatum Torr.
- ii. Flowers whitish-yellow. C. E. (*E. subalpinum*; *E. montanum*.) *E. umbellatum majus* Benth.
- ff. Peduncle with a bract or a whorl of leaves other than those where the rays of the umbel arise.
- j. Only 1 involucre in the inflorescence; plant glabrous or nearly so except the involucre.
- k. Pedicels solitary. U.
E. siskiyouensis Small
- kk. Pedicels several together in an umbel. E.
E. tolmieanum Hook.
- jj. More than 1 involucre in the inflorescence; plant more or less tomentose.
- l. Peduncle with a single bract near the middle; leaves oblanceolate to oval. E. (*E. stellatum bahiaeforme*; *E. croceum*).
E. stellatum Benth.
- ll. Peduncle with a whorl of leaves near the middle; leaves narrowly oblanceolate. E. (*E. heracleoides angustifolium*).
E. heracleoides Nutt.

RUMEX

DOCK

Herbs (ours) or shrubs or trees, annual or biennial or perennial, juice more or less sour or acid. Stem grooved, mostly branched, creeping to erect. Leaves alternate,

flat or crisped, entire or undulate; stipules sheathing. Flowers small, green, perfect or polygamous or dioicous, on jointed pedicels, in racemose or paniculate whorls or fascicles. Perianth 6-parted or of 6 distinct segments; outer segments herbaceous, spreading or reflexed; inner segments larger than the outer, more or less colored, becoming enlarged and reticulate in fruit, often with cork swellings. Stamens 6; filaments very short. Style 3-parted; stigma tufted, peltate. Fruit 3-angled, enclosed in the 3 inner perianth-segments. (L. rumo==to suck; because the Romans sucked the leaves to allay thirst.)

A. Coarse plants, usually over 4 dm. high, not strongly sour; flowers not dioicous.

B. Inner perianth-segments in fruit entire, or merely erose or undulate.

C. None or only 1 of the inner perianth-segments in fruit with cork.

D. Inner perianth-segments in fruit 15—37 mm. wide, 20—40 mm. long, without corks; leaves flat. E.

R. venosus Pursh (Big-seed Dock)

DD. Inner perianth-segments in fruit 4—9 mm. wide, 6—10 mm. long.

E. All inner perianth-segments in fruit without cork.

F. Leaves crisped, oblong, truncate at base. W. E. (*R. confinis*.)

R. occidentalis Wats. (Western Dock)

FF. Leaves flat, lanceolate, rounded at base. E.

R. hesperius Gr.

EE. One inner perianth-segment in fruit with cork. E.

R. patientia L. (Patience Dock)

CC. Each inner perianth-segment in fruit with a cork.

G. Inner perianth-segments in fruit 3—6 mm. wide.

H. Stems tufted, ascending; leaves flat, not crisped. W. E. (*R. salicifolius*.)

R. mexicanus Meisn. (Willow Dock)

HH. Stems mostly not tufted, erect; leaves crisped at margin. W. E.

R. crispus L. (Yellow Dock)

GG. Inner perianth-segments in fruit scarcely 2 mm. wide; leaves somewhat crisped. W.

R. conglomeratus Murr. (Ring-seed Dock)

BB. Inner perianth-segments in fruit with slender teeth.

I. Perennial; teeth of inner perianth-segments more than 4, shorter than the segments are wide; fruit mostly with 1—2 corks.

J. Stems sparingly branched; often some of the lower leaves fiddle-shaped; inner perianth-segments with 10—20 teeth. W.

R. pulcher L. (Fiddle Dock)

JJ. Stems branched at every joint; none of the leaves fiddle-shaped; inner perianth-segments with 6—10 teeth. W. E.

R. obtusifolium L. (Bitter Dock)

II. Annual; teeth of inner perianth-segments 4, longer than the segments are wide; fruit with 3 corks. W. C.

R. persicarioides L. (Golden Dock)

AA. Slender plants, 4 dm. or less high, very sour; flowers dioicous.

K. Leaves gradually narrowed at base, not hastate, spatulate or lanceolate; pedicels jointed at the base; inner perianth-segments winged in fruit; akene smooth. C. E.

R. paucifolius Wats. (Mountain Dock)

KK. Leaves hastate, oblanceolate; pedicels jointed at the summit; inner perianth-segments not winged in fruit; akene granular. W. C. E. (*R. acetosa* for our region.)

R. acetosella L. Field Sorrel)

OXYRIA

Herbs, perennial, low; juice acid. Leaves mostly basal. Flowers in paniced racemes, small, perfect; involucre none. Perianth unequally 4-parted, outer segments smaller than the inner. Stamens 6, included; filaments short, subulate, glabrous. Style short, 2-parted, its branches divergent; stigmas 2, sessile, fimbriate, persistent. Fruit thin, lens-shaped, broadly winged. (Gk. oxys=sharp, sour; the leaves are sour.) W. C. E.

O. digyna Hill (Mountain Sorrel)

POLYGONUM

KNOT-WEED

Herbs or shrubs, annual or perennial, terrestrial or aquatic. Stems erect or prostrate or climbing or floating. Leaves alternate, sessile or petioled, entire or merely roughish, continuous with the stipular sheath or jointed to it; sheath cylindric or funnel-shaped or 2-lobed, often lacerate or fringed. Inflorescence various, terminal or axillary. Flowers small, normally perfect, green or white or pink or purple; pedicels not jointed, subtended by small sheaths. Perianth 4—6-parted or -cleft; outer segments somewhat larger than the inner. Stamens 3—9, included or exserted; filaments filiform or dilated at base, glabrous. Style 2—3-parted or -cleft, its branches included or exserted; stigmas capitate. Fruit lens-shaped or 3-angled, rarely 4-angled, enclosed by or exceeding the perianth. (Gk. polys=many, gonu=knee, joint; because the stems are distinctly many-jointed.)

A. Plants erect to prostrate, but not vines; leaves cordate to attenuate at base.

B. Leaf-blade jointed to the petiole (except subgenus *DURAVIA*), less than 1 cm. wide (except *P. erectum*); sheath 2-lobed, becoming lacerate; flowers either in axillary fascicles or in spike-like racemes with non-scarious bracts; filaments mostly dilated at base.

C. Leaf-blade jointed to the petiole, not longitudinally 3-veined.

AVICULARIA (p. 136)

CC. Leaf-blade not jointed to the petiole, longitudinally 3-veined.

DURAVIA (p. 138)

BB. Leaf-blade not jointed to the petiole, at least some over 1 cm. wide; sheath not 2-lobed (except *P. alpinum*); flowers in spike-like racemes (except subgenus *ACONOGONON*); bracts small, scarious, or none; filaments not or hardly dilated.

D. Perennial or annual, without rhizomes, mostly lowland plants; sheath cylindric, truncate; stamens 4—8; akenes 3-angled or lens-shaped. *PERSICARIA* (p. 138)

DD. Perennial, with horizontal and elongated or corm-like rhizomes, alpine or subalpine plants; sheath oblique; stamens 8; akenes 3-angled.

E. Inflorescence of but 1 spike-like raceme, terminal; plants not growing in water nor particularly wet places.

BISTORTA (p. 139)

EE. Inflorescence of more than 1 cluster, axillary and terminal; plants growing in wet places.

ACONOGONON (p. 139)

AA. Plants twining or climbing, vines; leaves sagittate or sagittate-cordate.

TINIARIA (p. 140)

Subgenus *AVICULARIA* (KNOT-WEED)—Leaves and the bracts jointed on the petiole, veinless or 1-veined or obscurely pinnate-veined; petiole very short, adherent to the sheath; sheath 2-lobed or lacerate. Perianth 5—6-parted, usually more or less herbaceous. Stamens 3—8; the inner filaments dilated at base. Styles 3. Akenes 3-angled.

A. Plants annual, glabrous or not; stems not woody, greenish, mostly striate, not scaly.

B. Flowers axillary thruout.

- C. Fruit reflexed.
 - D. Sheaths 3—5 mm. long; leaves averaging less than 13 mm. long. E. (*P. austinae*.) *P. engelmannii* Gr.
 - DD. Sheaths 10—25 mm. long; leaves averaging 25 mm. long or longer.
 - E. Upper bracts lanceolate to oblong, foliaceous. E. (*P. douglasii montanum*.) *P. montanum* Gr. (Mountain Knot-weed)
 - EE. Upper bracts subulate, small.
 - F. Flowers funnelform, 2—3 mm. long; sheaths 1—13 mm. long. W. C. E. *P. douglasii* Gr. (Douglas Knot-weed)
 - FF. Flowers campanulate, 3.5—4.5 mm. long; sheaths about 20 mm. long. E. *P. majus* Pip.
- CC. Fruit erect or spreading.
 - G. Plants prostrate-spreading.
 - H. Akene not exceeding the calyx.
 - I. Leaves not conspicuously veined, not notably thick; akenes dull. W. E. *P. aviculare* L. (Door-weed)
 - II. Leaves conspicuously veined, thick; akenes slightly shining. W. (*P. littorale*.) *P. aviculare littorale* Koch (Shore Knot-weed)
 - HH. Akene projecting beyond the calyx. W. *P. fowleri* Rob.
 - GG. Plants erect or ascending.
 - J. Leaf margin serrulate-scabrous; akene smooth, shining. U. *P. howellii* Gr.
 - JJ. Leaf margin entire.
 - K. Leaves rather wide, scarcely reduced toward the stem-tip.
 - L. Plant 20—60 cm. high, not alpine; leaves 1.2—12.5 cm. long; akenes mostly granular, dull. W. E. *P. erectum* L. (Erect Knot-weed)
 - LL. Plant 2.5—7.5 cm. high, alpine; leaves 0.5—1.2 cm. long; akenes smooth, shining. C. E. *P. minimum* Wats. (Alpine Knot-weed)
 - KK. Leaves narrow, decidedly reduced toward stem-tip; akenes smooth, shining.
 - M. Plant branched thruout; leaves acuminate; flowers in the axils of the upper leaves; stamens 3—6. E. *P. ramosissimum* Michx. (Bushy Knot-weed)
 - MM. Plant branched only from base; leaves acute; flowers in the axils of almost all the leaves; stamens 6—8. E. *P. sawatchense* Small
- BB. Flowers in terminal bracted spike-like racemes.
 - N. Leaves more or less revolute; spike-like racemes hardly interrupted, rather dense; perianth with some pink or red.
 - O. Plants minutely puberulent thruout; stem prostrate or ascending. W. *P. lineare* Hook.
 - OO. Plants glabrous thruout; stem erect.
 - P. Sheaths 2—4 mm. long; filaments dilated at base. W. C. E. *P. nuttallii* Small (Pink Knot-weed)
 - PP. Sheaths 8—15 mm. long; filaments not dilated at base. W. *P. spargulariaeforme* Meisn.
 - NN. Leaves not revolute; spike-like racemes interrupted but rather closely so; perianth pinkish or white or green.

- Q. Bracts of the inflorescence white-margined; stamens 8. W. E.
P. polygaloides Meisn.
- QQ. Bracts of the inflorescence not white-margined; stamens fewer.
- R. Plant branched from base; styles none or almost none; akene brown, smooth. C. E. *P. kelloggii* Gr.
- RR. Plant simple; style evident; akene black, striate. E. (*P. confertiflorum*.) *P. watsoni* Small
- AA. Plants perennial, glabrous; stems shrubby, chestnut-brown; bark loose-scaly.
- S. Seacoast plant, in sandy soil; leaves strongly revolute; sheaths 12—21 mm. long; flowers in subspicate clusters near the ends of the branches. W.
P. paronychia C. & S. (Shrub Knot-weed)
- SS. Mountain plant, in rocky soil; leaves not revolute; 4—6 mm. long; flowers 2—3 together in the axils of the leaves. C. E.
P. shastensis Brew. (Shasta Knot-weed)

Subgenus DURAVIA (3-VEINED KNOTWEED)—Herbs, annual, low, erect, very slender, branching. Flowers solitary, sessile, in the axils of foliaceous bracts. Leaves very narrow, rigid, not jointed on the petiole, strictly 3-veined; stipules fimbriate or 2-lobed. Perianth colored, 5-parted, appressed to the akenes. Stamens 8; inner filaments scarcely dilated. Styles 3, persistent. Akene 3-angled.

- A. Akene obovate; spike rather stout.
- B. Sheath 6—8 mm. long, its segments rigid; upper leaves reduced. E.
P. greenei Wats.
- BB. Sheath 2—3 mm. long, its segments not rigid; leaves much the same size thruout. E. *P. parryi* Gr.
- AA. Akene narrowly lanceolate; spike very slender; sheath about 2 mm. long; upper leaves reduced. W. C. *P. californicum* Meisn.

Subgenus^{*} PERSICARIA (SMART-WEED)—Flowers fascicled in spikes, with small scarious bracts; spikes usually dense. Leaves not jointed on the petiole, pinnately many-veined; sheaths cylindric, truncate, scarious, entire, naked or ciliate-fringed. Perianth colored, 5-parted, appressed to the akene. Stamens 4—8; filaments filiform. Stigmas 2—3. Akene 3-angled or lens-shaped.

- A. Sheaths bristly-ciliate.
- B. Sepals dotted with dark glands; annual; akene lens-shaped or 3-angled.
- C. Racemes drooping; akene granular or dull. W. E.
P. hydropiper L. (Water Pepper)
- CC. Racemes erect; akene smooth, shining.
- D. Spikes distinctly peduncled. W. E.
P. punctatum Ell. (Dotted Smart-weed)
- DD. Spikes not distinctly peduncled. E.
P. punctatum leptostachyum Small
- BB. Sepals not dark-dotted.
- E. Spike 3—6 cm. long, slender, not dense, interrupted; style 3-cleft; akene 3-angled. W. E. *P. hydropiperoides* Michx. (Mild Water Pepper)
- EE. Spike 1.2—3.5 cm. long, thick, dense, not interrupted except sometimes at base; styles 2 or 2-cleft, rarely 3-cleft; akene lens-shaped, rarely 3-angled.
- F. Leaves mostly with a dark blotch near the middle; plant glabrous, never aquatic; spikes several. W. E.
P. persicaria L. (Lady's Thumb)

- FF. Leaves not dark-blotched; plant hispid unless in water; spike only 1. W.
 E. *P. hartwrightii* Gray
- AA. Sheaths nearly or quite without cilia.
- G. Annual, in damp places; spikes several.
- H. Leaves white-tomentose beneath. E. (*P. lapathifolium incanum*.)
P. tomentosum Schrank (Woolly Smart-weed)
- HH. Leaves not white-tomentose beneath.
- I. Spikes erect; akene orbicular. E.
P. pennsylvanicum L.
- II. Spikes drooping at least at tip; akene ovoid.
- J. Calyx and style each parted to below the middle. W. E. (*P. lapathifolium incanum*; *P. lapathifolium nodosum*; *P. nodosum*.)
P. lapathifolium L.
- JJ. Calyx and style each parted nearly to the base. E.
P. incarnatum Ell.
- GG. Perennial, in water or mud; spike only 1.
- K. Leaves oblong-elliptic, obtuse; spikes 1.2—2.5 cm. long; peduncles glabrous or nearly so. W. E. *P. amphibium* L. (Water Smart-weed)
- KK. Leaves ovate, acuminate; spikes 3—10 cm. long; peduncles hispid, often glandular. W. E. (*P. muhlenbergii*.)
P. emersum Brit. (Swamp Smart-weed)

Subgenus BISTORTA (SMART-WEED)—Herbs, perennial, alpine or subalpine, glabrous, with creeping rhizomes; stem simple. Leaves pinnately veined, not jointed to the petiole; sheaths oblique, truncate, naked. Flowers in dense spike-like racemes; bracts scarious, ovate or lanceolate, naked. Perianth colored, deeply 5-cleft, at length appressed to the akene. Stamens 8; filaments filiform. Styles 3, long. Akene 3-angled.

- A. Rhizome elongated; spike bearing flowers thruout. W. C. E.
P. bistortoides Pursh
- AA. Rhizome corm-like; spike bearing bulblets at base. C. E.
P. viviparum L.

Subgenus ACONOGONON (SMART-WEED)—Herbs, perennial, branching, with running rhizomes. Leaves pinnately veined, not jointed to the petiole; sheaths naked, entire or bifid. Flowers in terminal and axillary racemes or panicles or cymelets; bracts small. Perianth colored, 5-parted, attenuate at base, at length loosely appressed to the akene. Stamens 8; filaments filiform. Styles 3, short. Akene 3-angled.

- A. Sheaths 1—12 mm. long; flower clusters mostly axillary.
- B. Sheaths 1—3 mm. long; flowers usually more than 4 in a cluster; perianth segmented to near the base. C.
P. newberryi Small
- BB. Sheaths 6—12 mm. long; flowers 2—4 in a cluster; perianth segmented to near the middle. C. E. *P. davisiae* Brew.
- AA. Sheaths 13—50 mm. long; flower clusters mostly paniced.
- C. Leaves lanceolate to ovate-lanceolate; perianth white or greenish; akene obovoid. C. E.
P. alpinum All.
- CC. Leaves ovate to ovate-lanceolate; perianth white or pinkish; akene ovoid. E. (*P. alpinum alaskensis*; *P. alpinum foliosum*.)
P. phytolaccaefolium Meisn.

Subgenus **TINIARIA** (BIND-WEED)—Herbs, annual or perennial, with fibrous roots, mostly climbing or twining. Leaves cordate to sagittate. Flowers in loose panicles or racemes, or in terminal or axillary clusters. Perianth green, with colored margins, 5-parted or rarely 4-parted, enlarged or keeled in fruit. Stamens mostly 8. Styles or stigmas 3. Akene 3-angled.

A. Annual; stems somewhat rough; outer perianth-segments narrowly winged or not at all; akene minutely roughened, dull. W. E.

P. convolvulus L. (Black Bind-weed)

AA. Perennial; stems smooth; outer perianth-segments broadly winged; akene smooth, shining. W. E. (*P. dumetorum scandens*; *P. dumetorum* for our region.)

P. scandens L. (False Buckwheat)

FAGOPYRUM

BUCKWHEAT

Herbs, annual (ours) or perennial, rather fleshy, usually glabrous, leafy. Stems erect, simple or branched, striate or grooved. Leaves alternate, petioled, hastate or deltoid; sheaths oblique or cylindric or funnelform. Flowers small, white or green, perfect, in clusters of 1 to several from small sheaths; clusters grouped in racemes or panicles, these terminal or axillary; pedicels slender. Perianth about equally 5-parted, persistent and unchanged in fruit; segments petal-like, shorter than the akene in fruit. Stamens 8, included; filaments filiform, glabrous. Style 3-parted; stigmas capitate. Fruit 3-angled. Persisting after cultivation. (Gk. *phagos*=edible, the beech, *pyros*=wheat; the seed resembles a beech-nut.) W. *F. esculentum* Moench (Buckwheat)

CHENOPODIACEAE

Goosefoot Family

Herbs or shrubs, annual or perennial, *often mealy*. Stems terete or striate or angular. Leaves alternate or opposite, simple, entire or toothed or lobed, mostly petioled, sometimes mere scales or ridges (*Salicornia*); *stipules none*. Flowers commonly in panicled spikes, perfect or polygamous or monoicous or dioicous, usually small, green or greenish, regular or nearly so; *bracts none or green or fleshy*. Perianth persistent, 2—7-lobed or -parted or quite distinct or rarely of only 1 segment, sometimes none in pistillate flowers; segments alike. Stamens as many as the perianth-segments or fewer, opposite them; filaments slender. Ovary mostly *superior*, 1-celled; styles 1—3; stigmas capitate or 2—3-lobed or -divided. *Fruit a utricle*. Seed 1.

A. Leaves not reduced to scales, alternate in nearly all; branches not conspicuously opposite; stems not conspicuously jointed, not very fleshy.

B. Leaves opposite.

C. Plants perennial, herbs, not shrubby; flowers perfect; perianth of 5—7 segments. NITROPHILA (p. 141)

CC. Plants either annual herbs or shrubby perennials; flowers imperfect; perianth none or 2—5-parted. ATRIPLEX (p. 142)

BB. Leaves alternate.

D. Herbs, sometimes shrubby at base; leaves entire or not; flowers perfect in most; fertile flowers with perianth in most.

E. Leaves not linear; perianth-segment 1; stamen 1. MONOLEPIS (p. 142)

EE. Either leaves linear, or perianth-segments and stamens 2 or more.

F. Flowers monoicous or dioicous; fertile flowers without perianth; leaves not linear in most. ATRIPLEX (p. 143)

- FF. Flowers perfect; perianth of 1—5 segments or lobes; leaves various.
- G. Leaves wider than linear. CHENOPODIUM (p. 141)
- GG. Leaves linear.
- H. Leaves flat, not fleshy, not spine-like.
- I. Stem not hairy, glabrous or slightly mealy; leaves mealy beneath; flowers clustered or paniced, with 2—5-toothed or -parted perianth. CHENOPODIUM (p. 141)
- II. Stem more or less villous-pubescent, not mealy; leaves not mealy; flowers solitary in the axils of the reduced upper leaves, naked or with 1 perianth-segment. CORISPERMUM (p. 144)
- HH. Leaves somewhat terete or angular, sometimes fleshy or spine-like.
- J. Leaves rigid and prickly-pointed making the plant prickly to the touch; tumble-weed. SALSOLA (p. 145)
- JJ. Leaves not prickly-like; plant not prickly to the touch, not a tumble-weed.
- K. Stem glabrous or somewhat pubescent; perianth not hairy; styles 2—4. SUAEDA (p. 145)
- KK. Stem more or less villous-tomentose; perianth densely white-tomentose; style 1. KOCHIA (p. 144)
- DD. Shrubs; leaves entire; flowers unisexual; fertile flowers without perianth.
- L. Plant densely white-tomentose with stellate hairs, not spinescent; bracts of fruit with 4 tufts of long hairs; pericarp hairy. EUROTIA (p. 144)
- LL. Plant not hairy as above, spinescent (except *Atriplex nuttallii*); pericarp glabrous.
- M. Leaves linear, quite fleshy, somewhat terete; perianth present in pistillate flowers but not in staminate. SARCOBATUS (p. 144)
- MM. Leaves wider than linear, not or only slightly fleshy, flat, not terete; perianth present in staminate flowers but not in pistillate.
- N. Leaves 12—31 mm. long; plant spiny; bracts obcompressed, in fruit united into a sac; perianth-segments of staminate flowers 4. GRAYIA (p. 143)
- NN. Either leaves only 4—17 mm. long or plant not spiny; bracts compressed, in fruit united but not to the top; perianth-segments of staminate flowers 5. ATRIPLEX (p. 143)
- AA. Leaves almost none or mere scales, opposite; branches opposite; stems conspicuously jointed, very fleshy. SALICORNIA (p. 144)

NITROPHILA

Herbs, perennial, low, branching. Leaves opposite, fleshy. Flowers perfect, small, axillary, mostly 2-bracted. Perianth segments 5—7, distinct, erect keeled. Stamens as many as the perianth-segments, united into a very narrow perigynous disk. Style short; stigmas 2. Utricle subglobose, indehiscent, beaked by the persistent style, included within the connate perianth-segments. In moist alkaline soil. (Gk. nitron=native soda, philos=loving; referring to the alkali habitat.) E.

N. occidentalis Wats.

CHENOPODIUM

GOOSE-FOOT

Herbs, annual or perennial, glabrous or white-mealy or glandular-pubescent. Leaves alternate, entire or sinuate-toothed or pinnately lobed, petioled. Flowers in spikes or heads and these composed of glomerules or solitary flowers, perfect, small, green, sessile, bractless. Perianth 2—5-parted or -lobed, embracing or enclosing the utricle; segments

herbaceous or partly fleshy, often keeled or ridged. Stamens 1—5. Styles 2—3. Seeds lens-shaped. (Gk. chen=a goose, pous=a foot; referring to the form of the leaves of some species.)

A. Plant glandular, more or less aromatic.

B. Leaves with oak-like lobing; inflorescence loose panicles of unclustered flowers. E.

C. botrys L. (Jerusalem Oak)

BB. Leaves with lobing not oak-like; inflorescence loose spikes of dense flower-clusters. W. (*C. ambrosioides anthelminticum*.)

C. anthelminticum L. (Worm-seed)

AA. Plant not glandular, not aromatic.

C. Perianth dry in fruit, not or hardly reddish; stamens 5; seeds horizontal.

D. Leaves entire, linear or linear-lanceolate; pericarp loose, easily separated from the seed. C. E. *C. leptophyllum* Nutt. (Narrow-leaved Goose-foot)

DD. Leaves dentate, broadly lanceolate to triangular; pericarp firmly attached to the seed.

E. Leaves about twice as long as wide, mealy at least beneath (scarcely so in *C. album viride*); calyx completely enclosing the fruit.

F. Leaves whitish-green and mealy at least beneath. W. E.

C. album L. (Lamb's Quarter)

FF. Leaves green on both side or but slightly mealy. E.

C. album viride Moq.

EE. Leaves 1—1½ times as long as wide, with little or no meal when mature; calyx not completely enclosing the fruit.

G. Leaf-teeth more than 8, notched to ¼ the distance to mid-vein or less; leaf-base cuneate to truncate. W.

C. murale L. (Sow-bane)

GG. Leaf-teeth 2—6, notched to 1/3 the distance to mid-vein, leaf-base truncate to cordate. C. E.

C. hybridum L. (Maple-leaved Goose-foot)

CC. Perianth fleshy in fruit, red; stamens 1—5; some or all of the seeds vertical.

H. Leaf-base hastate to obtuse; perianth-lobes becoming fleshy; fruiting heads bright red and strawberry-like, 10—17 mm. in diameter. C. E. (*Blitum capitatum*.)

C. capitatum Asch. (Strawberry Blite)

HH. Leaf-base cordate to hastate; perianth-lobes herbaceous; fruiting heads somewhat reddish, not strawberry-like, 4—6 mm. in diameter.

I. Flowers in leafy spikes; seed 1 mm. wide. W. E.

C. rubrum L. (Red Goose-foot)

II. Flowers in axillary glomerules; seed 0.5 mm. wide. W. E. (*C. humile*.)

C. rubrum humile Wats. (Seaside Goose-foot)

MONOLEPIS

Herbs, annual, low, branching. Leaves alternate, small, narrow, entire to lobed. Flowers perfect or polygamous, in small axillary clusters without bracts. Perianth of a single persistent herbaceous segment. Stamen 1. Styles 2, filiform. Utricle flat. (Gk. monos=1, lepis=scale; referring to the single perianth-segment.)

A. Leaves mostly with a coarse tooth at each side at the base; perianth-segment acute; seed 1 mm. wide. E. (*M. chenopodioides*.)

M. nuttalliana Gr. (Toothed Monolepis)

AA. Leaves entire; perianth-segment obtuse; seed less than 0.5 mm. wide.

B. Leaves oblong, obtuse; flowers 1—2 in a cluster; pericarp adherent to the seed.

E. *M. pusilla* Torr. (Small Monolepis)

- BB. Leaves spatulate, acute; flowers 10—20 in a cluster; pericarp readily separating from the seed. E. *M. spatulata* Gray (Spatulate Monolepis)

ATRIPLEX

ATRIPLEX

Herbs or low shrubs, annual or perennial, often scurfy or silvery-canescant. Leaves alternate or some of them opposite, sessile or petioled. Flowers monoicous or dioicous, small, green, in axillary clusters; clusters spikes or head-like. Staminate flowers bractless: perianth 3—5-parted: stamens as many as the perianth-segments; filaments distinct or united at base: rudimentary ovary sometimes present. Pistillate flowers subtended by 2 bractlets; mature bracts enlarged, more or less united, margin entire or toothed, surface smooth or crested or tubercled or winged: perianth none: ovary globose or ovoid; stigmas 2. Utricle completely or partly enclosed by the 2 bractlets. (Gk. *atraxos*=not nourishing; they are weeds.)

- A. Herbs, annual; leaves not entire in most.

- B. Plants glabrous or nearly so.

- C. Leaves linear or lanceolate, rarely subhastate or toothed.

- D. Bracts linear. W.

A. zosterifolia Wats.

- DD. Bracts ovate-triangular. W. (*A. patula* of How. Fl.)

A. patula littoralis Gray (Seaside Atriplex)

- CC. Leaves ovate-triangular, mostly hastate, mostly dentate. E. (*A. hastata*.)

A. patula hastata Gray

- BB. Plants densely scurfy and silvery.

- E. Leaves 4—8 mm. long; fruiting bracts not margined nor appendaged. E.

A. pusilla Wats.

- EE. Leaves 12—100 mm. long; fruiting bracts margined or appendaged.

- F. Fruiting bracts 2—3 mm. long; their apex hardly indurated, truncate, 3-toothed; their sides not appendaged. E.

A. truncata Gray

- FF. Fruiting bracts 4—8 mm. long; their apex indurated, rounded or lobed, more than 3-toothed; their sides appendaged. E.

A. argentea Nutt. (Silvery Atriplex)

- AA. Shrubs or shrubby at base, perennial; leaves entire.

- G. Leaves oblong-spatulate to narrowly oblanceolate, 12—50 mm. long; bracts 2—4 mm. long. E.

A. nuttallii Wats.

- GG. Leaves ovate to obovate, 4—17 mm. long; bracts 8—13 mm. long. E.

A. confertifolia Wats.

GRAYIA (Eremosemium)

HOP SAGE

Shrubs, low, somewhat spiny. Leaves alternate, entire. Flowers monoicous or dioicous, small, in axillary clusters or terminal spikes. Staminate flowers bractless: perianth mostly 4-parted: stamens 4—5, central. Pistillate flowers enveloped in bracts; bracts obcompressed, membranous, united into a sac; sacs orbicular, flattened, with small naked orifice at apex, adherent to each other below, becoming enlarged and reticulate-veined and vertically wavy-margined: perianth none: styles 2, slender, at first exserted. (Honor of Asa Gray, an American botanist.) E.

G. spinosa Moq.

EUROTIA

WINTER FAT

Herbs or shrubs (ours), perennial, pubescent. Leaves alternate, entire, narrow. Flowers monoicous or dioicous, in axillary spikes or heads. Staminate flowers without bracts: perianth 4-parted, the lobes without appendages: stamens 4, exserted. Pistillate flowers with 2 bracts; bracts sessile, united nearly or quite to the summit, 2-horned, densely covered with long silky hairs: perianth none: ovary ovoid, sessile, pubescent; styles 2, exserted. Seed obovate. (Gk. euros=mold; referring to the white-hairy herbage.) E.

E. lanata Moq.

KOCHIA

WHITE SAGE

Herbs with shrubby base, perennial, low. Leaves alternate, sessile, entire. Flowers perfect or pistillate, in axillary clusters, sometimes with bracts. Perianth 5-lobed, herbaceous or membranous, at length with a horizontal wing or wingless, enclosing the fruit. Stamens 3—5. Ovary ovoid, narrowed into the style; stigmas 2. Utricle pear-shaped or oblong. (Honor of W. D. J. Koch, a German botanist.) E.

K. americana Wats.

CORISPERMUM

BUG-SEED

Herbs, annual. Leaves alternate, entire, narrow, 1-veined; upper leaves shorter and wider than the lower. Flowers small, perfect, green, bractless, solitary in the upper leaf-axils thus forming terminal narrow leafy spikes. Perianth none or present; segments 1 or rarely 2, thin, wide. Stamens 1—3, rarely more, 1 the larger. Ovary ovoid; styles 2. Utricle ellipsoid, mostly plano-convex. Seed acute or wing-margined. On sandy or alkaline soil. (Gk. koris=a bug, sperma=a seed; the seed is bug-like in appearance.)

A. Akene winged, 3—5 mm. long. E. (*C. nitidum*.)

C. hyssopifolium L.

AA. Akene wingless, 2—2.5 mm. long. E.

C. villosum Rydb.

SALICORNIA

SALT-HORN

Herbs, annual or perennial (ours), fleshy, glabrous; branches opposite, terete. Stems conspicuously jointed. Leaves opposite, mere scales or almost none. Inflorescence spikes, terminal, bracted. Flowers small, perfect or the lateral staminate, 3—7 together (3 in ours) in the axils of the spike-bracts. Perianth obpyramidal or rhomboid, fleshy, truncate or 3—4-toothed, becoming spongy in fruit, deciduous. Stamens 1—2, exserted. Ovary ovoid; styles or stigmas 2. Utricle enclosed by the spongy fruiting calyx. Seed flat. In salty water or bogs. (L. sal=salt, cornu=a horn; salt-plants with horn-like branches.) W. (*S. herbacea* for our region.)

S. ambigua Michx.

SARCOBATUS

GREASEWOOD

Shrub, erect, much-branched; branches spiny. Leaves alternate, linear, entire, sessile, fleshy. Flowers monoicous or dioicous. Staminate flowers in spikes; spikes terminal, ament-like, scaly; ament-scales peltate, rhombic-ovate, acute, spirally arranged: perianth none: stamens 2—5 under each scale. Pistillate flowers solitary or several together in the axils of bracts, sessile or nearly so: perianth flattened, ovoid or oblong, slightly 2-lipped, appendaged by a narrow border which becomes a narrow wing in fruit, adherent

to base of stamens: stigmas 2, subulate, exserted, papillose. In dry or alkaline soil. (Gk. sarkos=flesh, batos=a bramble; referring to the fleshy leaves and thorny stems.) E.

S. vermiculatus Torr.

SUAEDA (Dondia)

BLITE

Herbs or low shrubs, annual or perennial. Leaves alternate, narrowly linear, thick or nearly terete, entire, sessile. Flowers perfect or polygamous, bracted, solitary or clustered in the axils of the upper leaves. Perianth 5-parted or -cleft; segments fleshy, sometimes keeled or slightly winged in fruit, enclosing the utricle. Stamens 5. Styles usually 2, rarely 3—4, short, rather stout. Seed flat, smooth, black. In saline or alkaline soil. (Origin?)

A. Leaves widest just above their base.

B. Plants of the seashore, annual; fruiting perianth without crest or appendages.

W. *S. maritima* Dum. (Sea Blite)

BB. Plants of the plains, perennial; fruiting perianth with a crest on 1 or more of its lobes. E.

S. depressa Wats.

AA. Leaves narrowed at base.

C. Perianth in fruit with a transverse lobed wing; annual. E.

S. occidentalis Wats.

CC. Perianth in fruit without appendages or merely with a keel.

D. Annual; seed 0.9—1.1 mm. wide. E.

S. diffusa Wats.

DD. Perennial; seed 0.6—0.7 mm. wide. E.

S. intermedia Wats.

SALSOLA

RUSSIAN THISTLE

Herbs, annual (ours) or perennial, bushy-branched. Leaves alternate, rigid, prickly-pointed, rather fleshy. Flowers perfect, sessile, 2-bracted, solitary in the leaf-axils or sometimes several together. Perianth 5-parted; segments in fruit appendaged by a wide horizontal membranous wing, enclosing the fruit. Stamens 5. Ovary depressed; styles 2. Utricle flat. (Diminutive of *L. salsus*=salty; because most species grow in salty soil.)

W. E. (*S. pestifer*; *S. kali tragus* and *S. tragus* for our region.)

S. kali tenuifolia Mey.

AMARANTHACEAE

Pigweed Family

Herbs (ours) or shrubs. Leaves alternate (ours) or opposite, simple, mostly entire. Flowers perfect (not ours) or monoicous or dioicous or polygamous, small, green or white or purplish, with scarious bractlets, variously grouped, usually in terminal spikes or axillary heads. Perianth herbaceous or membranous, scarious, 2—5-parted; segments equal or the inner ones smaller, distinct or united at base. Stamens 1—5, mostly opposite the perianth segments, hypogynous; filaments distinct or somewhat united. Ovary ovoid or subglobose, superior, 1-celled; styles short or elongated or none; stigmas 1—3. Fruit a utricle. Seed 1 (ours), mostly smooth.

AMARANTHUS

PIGWEED

Annual, erect or diffusely spreading. Leaves pinnately veined, undulate or crisped or entire, petioled. Flowers monoicous or dioicous or polygamous, green or purplish, mostly with 3—5 bractlets, in dense terminal spikes or axillary clusters. Stamens 2—5. Styles

- or stigmas 2—3. Utricle 2—3-beaked by the persistent styles. Mostly weeds. (Gk. *amarantos*=unfading; because the colored calyx and bracts are chaffy and do not wither.)
- A. Stems erect, 3—20 dm. high; flowers in dense terminal spikes; sepals 5; stamens 5.
- B. Spikes green, stout, 8—14 mm. thick. E.
 A. retroflexus L. (Rough Pigweed)
- BB. Spikes purple, slender, 4—6 mm. thick. E. (*A. hybridus*.)
 A. paniculatus L. (Purple Pigweed)
- AA. Stems spreading or ascending (rarely erect in *A. graecizans*), 1.5—6 dm. long; flowers crowded in close small axillary clusters; sepals 1—3 (4—5 in *A. blitoides*); stamens 3 or fewer.
- C. Fertile flowers with 3 bracts and 3—5 sepals.
- D. Branches and flower-heads and leaves beneath all pinkish to deep flesh-color.
 E. *A. carneus* Gr.
- DD. Branches and flower-clusters and leaves all whitish or green.
- E. Plant prostrate; sepals 3—5, very little longer than the bracts; fruit not rugose; seed about 1.5 mm. wide. W. E.
 A. blitoides Wats. (Prostrate Pigweed)
- EE. Plant ascending or erect; sepals 3, much longer than the bracts; fruit rugose; seed about 0.8 mm. wide. E.
 A. graecizans L. (Tumbleweed)
- CC. Fertile flowers with 1 bract and 1 sepal. E.
 A. californicus Wats.

NYCTAGINACEAE

4 o'clock Family

Herbs (ours) or shrubs or trees; juice watery. Stems fragile; joints swollen. Leaves mostly *opposite* (so in ours), simple, entire, petioled; *stipules none*. Flowers perfect, in terminal or axillary clusters; clusters often subtended by an involucre (so in ours). *Perianth corolla-like*, tubular or campanulate or salverform, 4—5-lobed or -toothed. Stamens few; filaments slender. Ovary superior, 1-celled; stigma capitate. *Fruit in akene*, somewhat ribbed or grooved or winged, *enclosed by the hardened perianth-base*. Seed 1.

- A. Leaves narrowly ovate or wider; perianth not purple.
- B. Flowers about 5 cm. long; involucre-bracts 25—38 mm. long, united to above their middle; fruit not winged nor even strongly angled. MIRABILIS (p. 146)
- BB. Flowers 1—2.5 cm. long; involucre-bracts 4—19 mm. long, distinct to base; fruit 3—5-winged. ABRONIA (p. 147)
- AA. Leaves linear; perianth purple. ALLIONIA (p. 146)

MIRABILIS

4-O'CLOCK

Perennial. Flowers showy; clusters terminal; involucre calyx-like, 5-cleft or -parted, 1—12-flowered, not changed in fruit. Perianth tubular or more or less funnelform, with a spreading limb. Stamens usually 5, as long as the calyx; filaments united at base. Akene globose or ovoid-oblong, obscurely or hardly ribbed or angled, smooth. (L. *mirabilis*=wonderful; any striking flower is wonderful when first found.) C. E.

M. greenei Wats.

ALLIONIA (*Oxybaphus*)

UMBRELLA-WORT

Annual or perennial; stem forking. Leaves equal. Flowers in a panicle; panicle terminal, loose; involucre 5-lobed, 3—5-flowered, becoming enlarged and reticulate-veined after flowering. Perianth campanulate; its lobes contracted above the ovary;

limb oblique, 4—5-lobed. Stamens 3—5, usually 3, unequal. Akene obovoid or clavate, strongly ribbed, pubescent in our species. (Honor of C. Allioni, an Italian botanist.) E. *A. linearis* Pursh

ABRONIA

ABRONIA

Annual or perennial (ours); stems prostrate to erect, branched, mostly glandular-pubescent. Leaves thick, one of each pair somewhat the larger. Flowers sessile, conspicuous; clusters solitary or again clustered, on long peduncles. Perianth 5-lobed, tubular or funnelform below; limb spreading; lobes obcordate or emarginate. Stamens 3—5, unequal, on tube of perianth, included. Styles filiform. Akenes 1—5-winged; wings wide or narrow, reticulate-veined. Seed cylindric, smooth, shining. (Gk. abros= graceful, delicate. Does not seem to apply to ours very well.)

A. Plants of the seashore; flowers not white.

B. Leaves broadly ovate to reniform; involucre-bracts rounded to ovate or oblong; flowers yellow; wings of the fruit thick, hollow. W.

A. latifolia Esch. (Yellow Abronia)

BB. Leaves ovate to narrowly oblong; involucre-bracts narrowly lanceolate; flowers rose-colored; wings of the fruit thin, not hollow. W.

A. umbellata Lam. (Pink Abronia)

AA. Not plants of the seashore; flowers white.

C. Stems prostrate; involucre-bracts narrowly lanceolate; wings of the fruit thin, not hollow. E.

A. mellifera Dougl.

CC. Stems erect or ascending; involucre-bracts broadly ovate; wings of the fruit thick, hollow. E. (*A. fragrans glaucescens*.)

A. fragrans Nutt.

PHYTOLACCACEAE

Pokeweed Family

Herbs (ours) or shrubs or trees. Leaves alternate, simple, entire; stipules mostly none (so in ours). Flowers perfect (ours) or monoicous or polygamous, regular, usually in racemes (so in ours). Perianth 4—5-parted or of 4—5 distinct segments; segments all alike. Stamens as many as the perianth-segments, or more numerous (ours); filaments filaform, united at base or distinct. Ovary superior, several-celled in most genera (10 in ours); cells 1-ovuled; styles as many as the carpels, short or none; stigmas filiform. Fruit a berry (ours) or capsule or samara.

PHYTOLACCA

POKE-BERRY

Perennial, 1.2—3.6 m. high (ours). Racemes terminal but apparently opposite the leaves. Pedicels bracted at the base. Perianth-segments almost distinct, rounded, persistent. Stamens 4—10 (10 in ours), on base of perianth. Ovary globose; carpels 5—15 (10 in ours), distinct or somewhat united. Berry dark-purple (ours), depressed-globose. Seed compressed. (Gk. phyton=plant, L. lacca=lacquer; referring to the red juice in the berries.) E. *P. decandra* L.

AIZOCAEAE

Carpet-weed Family

Herbs, rarely somewhat woody (not ours); stems mostly prostrate, branching. Leaves basal or opposite or whorled (ours); stipules none, or scarious (ours), or the base of the petiole dilated. Flowers small, regular, solitary (ours), or in cymes or head-like clusters. Perianth distinguishable into calyx and corolla or not (ours); each whorl of the perianth 4—5-cleft or -parted. Stamens 3—5 (ours), hypogynous (ours) or perigynous.

Ovary usually *superior*, 3—5-celled; ovules numerous in each cell (ours). *Fruit a capsule*, *loculicidal* (ours) or *circumscissile*.

MOLLUGO

CARPET-WEED

Mostly annual (ours so). Stipules deciduous. Flowers whitish. Perianth 5-parted; segments persistent, scarious-margined, all alike. Stamens when 3 alternate with the cells of the ovary, when 5 alternate with the perianth-segments. Ovary ovoid or globose. Capsule usually 3-valved. Seed small. (The Latin name, related to *L. mollis*=soft; because they form a carpet-like growth.) E.

M. verticillata L.

PORTULACACEAE

Purslane Family

Herbs, low, generally *fleshy or succulent*, rarely somewhat woody. Leaves alternate or opposite. *Flowers regular, perfect, unsymmetric*, axillary or terminal. *Sepals usually 2*, in some more. Petals 0—many, entire or emarginate. Stamens as many as the petals or fewer, rarely more, opposite the petals when of the same number; filaments filiform. *Ovary superior, 1-celled; placenta central, free*; styles 2—9-cleft or -divided. *Fruit a capsule*, membranous or crustaceous, circumscissile or 2—3-valved. Seeds 2 to many, reniform-globose or compressed.

A. Sepals not scarious; styles or stigmas 3 or more.

B. Ovary quite free from the calyx; leaves either mostly basal or mostly scattered along the stem.

C. Caudex beset with short subulate spines which are the persistent midribs of former leaves; leaves terete, about 12 mm. long; sepals deciduous; stamens 20—30.

TALINUM (p. 149)

CC. Caudex not beset with spines or none; leaves either not terete or else more than 12 mm. long; sepals persistent; stamens fewer (except in some species of *Lewisia*).

D. Leaves either in a basal tuft or scattered along the stem; sepals 2—3; petals 2—5; stamens 3—10; styles or stigmas 3; capsule not circumscissile, 3-valved from apex.

E. Most of the leaves scattered along the stem, alternate, linear to lanceolate.

F. Leaves not scarious nor clasping at base, the upper linear, the lower lanceolate and petioled; stamens 3 or more; seed minutely tuberculate.

CALANDRINIA (p. 149)

FF. Leaves somewhat scarious and clasping at base, all linear and sessile; stamens 3; seed quite smooth.

MONTIA (p. 150)

EE. Leaves not as above in all characters.

G. Stems and leaves from a subterranean corm or the crown of a fleshy root; most of the leaves at the surface of the ground; involucre-leaves not united; either petals not twice as long as the sepals or involucre-leaves oblong or narrower.

CLAYTONIA (p. 149)

GG. Plants without corms or fleshy roots (except *M. sibirica*, which has a fleshy root-crown); leaves scattered along a stem above the ground, or involucre-leaves united, or petals about thrice as long as the sepals and involucre-leaves oblong.

MONTIA (p. 150)

DD. Leaves in a tuft on the top of the caudex; sepals 2—8; petals 10—16; stamens 5—50; styles or stigmas 3—8; capsule circumscissile.

LEWISIA (p. 151)

BB. Ovary adherent to the calyx along at least its lower half; most of the leaves scattered along the stem.

PORTULACA (p. 151)

AA. Sepals scarious at least at margin; styles or stigmas 2.

H. Stamens 3, longer than the petals and opposite the 3 larger ones; style very long, filiform; capsule globose-ovate.

SPRAGUEA (p. 149)

HH. Stamen 1, shorter than the petals and alternate with them; style very short or hardly any; capsule linear or oval.

CALYPTRIDUM (p. 149)

TALINUM

ROCK PINK

Annual or perennial, glabrous, fleshy. Stems scapose or fleshy, erect or ascending. Leaves alternate, terete or flat, often clustered at the base of the stem; stipules none. Flowers chiefly in cymes or racemes or panicles. Sepals 2, ovate, deciduous. Petal 5, fugacious, usually white or red. Stamens 20—30 in ours, adherent to the petal-bases. Styles 3-lobed or -cleft. Capsule ovoid or oval or globose (ours), 3-valved. Seeds numerous, smooth. (The native name of an African species.) E.

T. spinescens Torr.

CALANDRINIA

RED

Annual (ours), juicy. Leaves alternate (ours). Flowers in bracted racemes, ephemeral, red or rose-colored. Sepals 2, subequal, persistent. Petals 3—7. Stamens 3—10, rarely the same number as the petals. Capsule 3-valved from the summit, persistent. Seeds several, black, minutely tuberculate. (Honor of J. L. Calandrini, a Swiss botanist.) W. (*C. micrantha*; *C. caulescens menziesii*.)

C. caulescens HBK.

SPRAGUEA

Roots fleshy. Leaves either in a basal tuft or densely covering the stem. Flowers ephemeral, in scorpioid cymes; cymes dense, clustered; clusters umbel-like, on scape-like stems. Sepals 2, orbicular, emarginate at both ends, scarious-hyaline, persistent. Petals 4, somewhat unequal. Stamens 3, opposite the 3 larger petals, exserted. Style long, bifid at apex. Capsule 2-valved, membranous. Seeds 6—10, black, shining. Near summer snow-line. (Honor of a Mr. Sprague, a botanical artist who illustrated Gray's Botanies.) W. C. E. (*S. umbellata*.)

S. multiceps How.

CALYPTRIDUM

Annual, smooth. Leaves alternate, fleshy. Flowers small, ephemeral, in scorpioid spikes; spikes clustered; clusters axillary or terminal, dense, compound. Sepals 2, mostly unequal, ovate or orbicular, more or less scarious. Petals 2—4. Stamens 1—3, shorter than the petals and alternate with them. Capsule membranous, 2-valved. Seeds 6—12, basal, black, shining, circinate, compressed. In dry soil. (Gk. calypterion=a covering. Why?) E.

C. roseum Wats.

CLAYTONIA

SPRING BEAUTY

Perennial, juicy, glabrous; with corm or thickened caudex. Stem-leaves 2, opposite (1—3 and alternate in *C. megarrhiza*); basal leaves 1 or more. Flowers white or yellow or rose-color, in racemes; racemes simple or paniculate, terminal, naked, loose. Sepals 2, persistent. Petals always 5, free, equal, conspicuous. Stamens always 5. Style 3-

cleft. Capsule 3-valved from the top. Seeds not more than 6, compressed, orbicular or reniform, smooth, shining. (Honor of J. Clayton, an American botanist.)

A. Flowers yellow. E. *C. aurea* Nels.

AA. Flowers white or pink, with pink or purple veins.

B. Stems and leaves from a deep-seated corm; stem-leaves opposite, 2.

C. Stem 7.5—15 cm. high; stem-leaves sessile, narrowly lanceolate to oblong; corm globose. W. C. E.

C. lanceolata Pursh (Pigeon-root)

CC. Stem 2—5 cm. high; stem-leaves petioled, ovate to orbicular; corm oblong or fusiform. E. *C. umbellata* Wats.

BB. Stems and leaves from the top of a fleshy root; stem-leaves usually alternate, 1—3. E. *C. megarrhiza* Par. (Purple-root)

MONTIA

MINERS' LETTUCE

Annual or perennial, glabrous, juicy. Flowers pale or white, delicate, in racemes; racemes axillary or terminal, simple or compound, loose. Sepals 2—3, persistent. Petals 0—5, more or less united at base, usually unequal, 3 a little smaller than the other 2; stamens 3—5, on the very base of the corolla, opposite the petals. Capsule 3-valved. Seeds 3. (Honor of G. Monti, an Italian botanist.)

A. Stem-leaves opposite.

B. Stem-leaves 1 pair, often united into a disk.

C. Stem-leaves not united.

D. Plants with creeping rhizomes; most of the pedicels not subtended by bracts. W. C. E. (*Claytonia asarifolia*.)

M. asarifolia How.

DD. Plants without rhizomes; most of the pedicels subtended by bracts.

E. Basal leaves ovate.

F. Root-crown without bulblet-scales; sepals ovate. W. C. E. (*Claytonia sibirica*.) *M. sibirica* How. (Common Miners' Lettuce)

FF. Bases of radical leaves persisting on root-crown as bulblet-scales; sepals cordate. W. (*M. bulbifera*.)

M. sibirica bulbifera Rob.

EE. Basal leaves narrower than ovate.

G. Stem-leaves all quite separate; inflorescence 12—50 mm. long; petals 6 mm. long. E. (*Claytonia arenicola*.)

M. arenicola Hel.

GG. Stem-leaves somewhat united; inflorescence 6—12 mm. long; petals 2—4 mm. long. (See H.)

CC. Stem-leaves united at least at base.

H. Stem-leaves terete to ovate-lanceolate, not united into a disk but usually somewhat united at base at one or both sides.

I. Petals white; stem-leaves lanceolate to ovate-lanceolate, distinctly dilated. W. E. (*Claytonia spathulata*.)

M. spathulata How.

II. Petals usually rose-colored; stem-leaves terete to narrowly oblong, very little if any dilated. W. (*Claytonia spathulata exigua*; *M. tenuifolia*.)

M. spathulata exigua Rob.

HH. Stem-leaves wide, united into a disk which may however be lobed.

J. Calyx 4 mm. long; seed 2 mm. wide; pedicels in fruit rarely longer than the calyx; basal leaves from spatulate-obovate to reniform. W. C. E.

(*Claytonia perfoliata*; *Claytonia perfoliata implectans*.)

M. perfoliata How.

JJ. Calyx 2 mm. long; seed 1 mm. wide; pedicels in fruit 2—6 times as long as the calyx; basal leaves various.

K. Basal leaves spatulate to filiform-linear; inflorescence usually a loose raceme. W. C. E. (*Claytonia parviflora*.)

M. parviflora How.

KK. Basal leaves ovate to rhomboidal; inflorescence a head or umbel, sessile in the disk of stem-leaves. W. E. (*M. rubra*; *M. humifusa*; *Claytonia parviflora depressa*.)

M. parviflora depressa Rob.

BB. Stem-leaves several pairs, not united.

L. Plant perennial, with filiform runners; petals 6 mm. long, pale rose-color; leaves 25—50 mm. long including the petiole. W. E. (*Claytonia chamissonis*.)

M. chamissonis Gr. (Toad-lily)

LL. Plant annual, without runners; petals 2 mm. long, white; leaves 1.5—13 mm. long including the petiole. W. E. (*M. minor*; *M. hallii*.)

M. fontana L. (Blinks)

AA. Stem-leaves alternate.

M. Annual, without stolons; leaves not very fleshy; petals 5 mm. long or shorter; sepals 4 mm. long or shorter, a little shorter than the petals.

N. Leaves narrow, sessile, clasping at base; stamens 2—5; seed quite smooth.

O. Leaves linear, 12—75 mm. long; petals 5.

P. Leaves 2.5—7.5 cm. long; racemes dense; sepals about 4 mm. long; petals 4—5 mm. long; seed about 2 mm. wide. W. E. (*Claytonia linearis*.)

M. linearis Gr.

PP. Leaves 1.2—2.5 cm. long; racemes loose; sepals about 2 mm. long; petals 2—3 mm. long; seed less than 1 mm. wide. W. E. (*Claytonia dichotoma*.)

M. dichotoma How.

OO. Leaves spatulate, 4—8 mm. long; petals 0 or 2 or 3 or 5, 2 mm. or less long; seed 1 mm. wide. W. (*Claytonia Howellii*.)

H. howellii Wats.

NN. Leaves wide, petioled, not clasping at base; stamens 5; seed closely striate. W. (*Claytonia diffusa*.)

M. diffusa Gr.

MM. Perennial, with slender stolons; leaves very fleshy; petals 8—10 mm. long; sepals about 2 mm. long. W. C. E. (*Claytonia parvifolia*.)

M. parvifolia Gr. (Spraddles)

PORTULACA

PURSLANE

Annual, glabrous (ours) or pubescent, fleshy; stems prostrate (ours) to diffuse. Leaves alternate (ours) or opposite; stipules scarious or setaceous. Flowers terminal, yellow (ours). Sepals 2, united at base. Pistils 4—6, mostly 5, on the calyx, fugacious. Stamens 7 to many, on the calyx. Ovary many-ovuled, partly inferior; style deeply 3—9-cleft or -parted. Capsule membranous, dehiscent by a lid. Seeds many. (Said to be from L. porto—I carry, lacca=juice; the plants are fleshy.) E.

P. oleracea L.

LEWISIA (Oreobroma)

BITTER-ROOT

Perennial, stemless or nearly so except for the scapes; caudex and root thick, fleshy, perpendicular. Flowers on 1-flowered scapes or in panicles with scapose stalks, conspic-

uous or handsome, white to rose-color or deep red. Sepals 2—8, persistent. Petals 3—16. Stamens many. Styles 2—8-cleft or -parted. Capsule circumscissile at the very base. Seeds many, black, shining. (Honor of M. Lewis of the Lewis and Clarke expedition.)

A. Scapes 1-flowered, jointed about the middle; involucral bracts 5—7, near the middle of the scape; sepals 4—8; petals 10—15. E.

L. rediviva Pursh

AA. Scapes 1- to many-flowered, jointed at base; involucral bracts 2, near the calyx; sepals 2; petals 3—10.

B. Flowers many, in open paniculate racemes.

C. Leaves 12 mm. or more wide, spatulate to obovate.

D. Leaf-margin not hyaline nor crisped; filaments united at base. W.

L. cotyledon Rob.

DD. Leaf-margin hyaline, crisped; filaments free. W.

L. howellii Rob.

CC. Leaves 8 mm. or less wide, terete or linear-spatulate.

E. Petals 10—13 mm. long; leaves not glaucous, flat, linear-spatulate. W. C.

L. columbiana Rob.

EE. Petals about 6 mm. long; leaves glaucous, terete or subspatulate. W.

L. leana Rob.

BB. Flowers 1—5, in umbels.

F. Leaves obovate or linear-oblongate.

G. Leaves obovate; seed granulate. E.

L. tweedyi Rob.

GG. Leaves linear-oblongate; seed smooth. W.

L. oppositifolia Rob.

FF. Leaves linear or lanceolate.

H. Root fusiform or conical; petals 8 mm. or more long.

I. Sepals entire; petals white, 12—16 mm. long. E.

L. nevadensis Rob.

II. Sepals erose; petals red, about 8 mm. long. C. E.

L. pygmaea Rob.

HH. Root corm-like, globular; petals about 4 mm. long. C. E.

L. triphylla Rob.

CARYOPHYLLACEAE (Silenaceae) Chick-weed Family

Herbs, annual or perennial, often swollen at the base. *Leaves opposite* or apparently whorled, *entire or nearly so*; stipules present or none. Flowers perfect or rarely dioicous, regular. Sepals 4—5, persistent, distinct or united. Petals as many as the sepals or none. Stamens twice as many as the sepals or fewer, hypogynous or perigynous. *Ovary* 1, mostly 1-celled, rarely 3—5-celled; *styles* 2—5; *placenta central*. *Fruit a capsule*, membranous, opening by valves or teeth. *Seeds several or many*.

A. Sepals united into a cup or tube; petals always present, with slender claws; stipules none.

B. Calyx with 10 to many veins; styles 3—5.

C. Flowers 2.5—4 cm. in diameter; calyx-teeth 2—3 cm. long, foliaceous; petals dark purplish-red; styles 5, opposite the petals; leaves linear.

AGROSTEMMA (p. 153)

CC. Flowers mostly not so wide; calyx-teeth much shorter, not foliaceous; petals mostly not colored as above.

- D. Leaves mostly linear; styles 3; capsule opening by 3 or 6 teeth. SILENE (p. 153)
- DD. Leaves wider than linear; styles 5; capsule opening by 4 or 5 or 8 or 10 teeth. LYCHNIS (p. 155)
- BB. Calyx with 5 veins; styles 2. SAPONARIA (p. 156)
- AA. Sepals distinct or nearly so; petals none or without claws.
- E. Stipules none.
- F. Capsule cylindric; petals always present. CERASTIUM (p. 157)
- FF. Capsule ovoid or oblong.
- G. Styles either fewer than the sepals, or else as many and opposite them.
- H. Petals none or entire or merely emarginate; leaves often sharp-pointed, either terete or angular or narrowly linear, or else petals present. STELLARIA (p. 156)
- HH. Petals none or deeply divided into 2 lobes; leaves never sharp-pointed, flat, broadly linear or wider. ARENARIA (p. 158)
- GG. Styles as many as the sepals and alternate with them; petals none or entire or emarginate. SAGINA (p. 157)
- EE. Stipules present, scarious.
- I. Leaves apparently in whorls; styles 5; petals always present. SPERGULA (p. 160)
- II. Leaves opposite; styles 3, rarely 5; petals sometimes none. TISSA (p. 160)

AGROSTEMMA

CORN COCKLE

Annual, pubescent, often branching. Leaves sessile, linear or linear-lanceolate, acute or acuminate. Flowers white or red (ours), erect, large, solitary at the ends of long axillary peduncles. Calyx oblong, not inflated, narrowed at the throat, 10-ribbed, 5-lobed; lobes linear, elongated, foliaceous. Petals 5, shorter than the calyx-lobes; their blades obovate or cuneate, emarginate, not appendaged. Stamens 10. Styles 5, alternate with the calyx-lobes. Capsule 1-celled. Seeds many, black. (Gk. *agros*=field, *stemma*=a crown; on account of the beauty of the flowers.) W. E.

A. githago L.**SILENE**

CATCHFLY

Annual or perennial. Leaves mostly linear. Flowers mostly pink or white, solitary or in paniced racemes or cymose clusters. Calyx more or less inflated, tubular or ovoid or campanulate, 5-toothed or -cleft, 10- to many-veined, not bracted at base. Petals narrow, clawed. Stamens 10. Styles 3, rarely 4—5; ovary 1-celled or incompletely 2—4-celled. Pod opening by 3 or 6 teeth. Seeds many, spiny or tubercled. (Gk. *sialon*=saliva; on account of the sticky substance on the stem of some species.)

A. Calyx with 15 or more veins.

B. Leaves narrowly oblong to linear; calyx-veins 18—23, obscure. W. *S. multinervia* Wats.

BB. Leaves ovate-lanceolate; calyx-veins 15—20, prominent. W. E. (*S. vulgaris*.) *S. latifolia* B. & R. (Bladder Catchfly)

AA. Calyx with 5—10 veins.

C. Plant 2.5—5 cm. high; leaves crowded so as to hide the stem, linear. W. C. E. *S. acaulis* L. (Moss Catchfly)

CC. Plant taller; leaves not crowded so as to hide the stem, various in width.

D. Flowers 25 mm. or more wide.

- E. Leaves lanceolate to ovate-elliptic, acuminate; flowers deep red. W.
S. californica Dur.
- EE. Leaves oblanceolate, acute or obtuse; flowers white or pink. W.
S. hookeri Nutt.
- DD. Flowers 12—25 mm. wide.
- F. Petals entire, or emarginate, or 2-lobed or -cleft, or the 2 lobes again merely emarginate.
- G. A part of each of the upper internodes of the stem glutinous; stem otherwise glabrous or merely puberulent; plant annual or biennial.
- H. Flowers 3—4 mm. wide, paniculate; calyx ovoid; leaves linear to lanceolate. W. C. E.
S. antirrhina L. (Sleepy Catchfly)
- HH. Flowers 12—17 mm. wide, cymose; calyx club-shaped; leaves ovate-lanceolate. W. E.
S. armeria L. (Sweet-William Catchfly)
- GG. Stem either not sticky at all, or else viscid-pubescent and thus sticky thruout the whole of the internodes.
- I. Leaf-blades widest below their middle.
- J. Calyx 21—31 mm. long; plant annual or biennial, viscid-pubescent or hirsute. W. E.
S. noctiflora L. (Night-blooming Catchfly)
- JJ. Calyx 8—20 mm. long; plant perennial.
- K. Leaves ovate-lanceolate; flowers in the forks of the branches thus forming a leafy inflorescence; calyx 5—8 mm. long; plants finely glandular-pubescent. W. E.
S. menziesii Hook. (Menzies Pink)
- KK. Leaves narrower; flowers in cymes or spikes or panicles which are not leafy; calyx longer.
- L. Plant viscid-tomentose; inflorescence subspicate or cymose-paniculate; petal-blades scarcely exceeding the 4 appendages; ovary stipitate. E.
S. spaldingii Wats.
- LL. Plant pubescent but not viscid; inflorescence 3—5-flowered cymes; petal-blades quite longer than the appendages; ovary not stipitate. W. C. E. (*S. douglasii monanthe*; *S. monanthe*; *S. douglasii multicaulis*; *S. multicaulis*; *S. douglasii brachycalyx*; *S. columbiana*.)
S. douglasii Hook.
- II Leaf-blades widest at or above their middle.
- M. Inflorescence a whorled spike; flowers many; stem-hairs not jointed; petals 2-lobed, the lobes again emarginate. W. E.
S. scouleri Hook.
- MM. Inflorescence a simple 1-sided raceme, often spike-like; flowers several to many; stem-hairs white, jointed; petals entire to 2-lobed, the lobes not emarginate. W. (*S. gallica*; *S. gallica quinquevulnera*.) *S. anglica* L. (English Catchfly)
- MMM. Inflorescence a panicle, or flowers only 1—7 and scattered; stem-hairs not jointed; petals emarginate or 2-lobed, the lobes not again emarginate.
- N. Plants 1—2.5 dm. high; leaves 0.6—2.5 cm. long.

- O. Petal-lobes entire; petal-appendages retuse. (Apparently *S. tetonensis*.) C. E.
S. suksdorfii Rob.
- OO. Petal-lobes each with a short lateral tooth; petal-appendages obtuse. W. C.
S. watsoni Rob.
- NN. Plants 3—9 dm. high; leaves 2.5—7.5 cm. long.
- P. Stem with leaves; basal leaves 1-veined, 2—4 mm. wide. W. C. E.
S. douglasii Hook.
- PP. Stem with 1—2 pairs of bracts but no leaves; basal leaves 3-veined, 6—11 mm. wide. E.
S. scaposa Rob.
- FF. Petals with 4 or more distinct lobes or divisions.
- Q. Flowers borne in the forks of the branches and forming a leafy inflorescence.
- R. Leaves lanceolate; limb of petal flesh-colored. W. C.
S. campanulata Wats.
- RR. Leaves ovate; limb of petal greenish-white. W. C. (*S. greenei*.)
S. campanulata greenei Wats.
- QQ. Flowers in naked or bracted cymes or panicles.
- S. Calyx campanulate; ovary not stipitate. W. C. E. (*S. douglasii* *viscida*; *S. douglasii microcalyx*; *S. lyallii*.)
S. macounii Wats.
- SS. Calyx cylindric or obovoid; ovary stipitate but in some very shortly so.
- T. Calyx 7—9 mm. long. W. (*S. longistylis*.)
S. lemmoni Wats.
- TT. Calyx 12—19 mm. long.
- U. Plant fetid, very viscid. C. E.
S. oregana Wats.
- UU. Plant not fetid, not glandular or only somewhat so above.
- V. Petals 2-parted, each part again 2-lobed. W.
S. montana Wats.
- VV. Petals 3-parted, each part again 2-lobed. W.
S. gormanii How.

LYCHNIS

COCKLE

Perennial (ours), mainly erect. Calyx ovoid or obovate or clavate, 10-veined, usually inflated, 5-toothed; teeth short, not foliaceous. Petal-blade entire or variously lobed or cleft. Stamens 10. Ovary 1-celled, partly 4—5-celled at base; styles 5, rarely 4, opposite the sepals when of the same number. Capsule opening by as many or twice as many teeth as there are styles. (Gk. *lychnos*=a lamp or light; referring to the flame-like color of some species.)

A. Plant white-woolly; flowers 25 mm. or more long; calyx-teeth twisted; petals exserted, spreading above the calyx. W. E.

L. coronaria Desr. (Mullein Pink)

AA. Plant ashy-puberulent to glabrous; flowers 12—21 mm. long; calyx-teeth not twisted; petals not or very little spreading above the calyx.

B. Plant dwarf, caespitose; stems 1-flowered; petals exserted. E.

L. kingii Wats.

- BB. Plant 2—5 dm. high, erect; stems few-flowered; petals included or nearly so.
W. E. *L. drummondii* Wats. (Drummond Pink)

SAPONARIA

SOAPWORT

Annual or perennial, glabrous, diffuse or erect. Leaves mostly wide (so in ours). Flowers white or pink or red. Calyx ovoid to tubular, 5-toothed. Petals entire or emarginate, long-clawed. Stamens 10. Ovary 1-celled or incompletely 2-celled; styles 2. Capsule ovoid or oblong, opening by 4 valves which appear as apical teeth. (L. *sapo*=soap; the mucilaginous juice lathers with water.)

- A. Annual, dichotomously branched; calyx sharply 5-angled, 1—15 mm. long, oblong or ovate. W. E. (*Vaccaria vaccaria*.)

S. vaccaria L. (Cow Herb)

- AA. Perennial, not dichotomously branched; calyx terete, 16—21 mm. long, tubular.
E. *S. officinalis* L.

STELLARIA (Alsine)

CHICKWEED

Annual, tufted, generally diffuse, low, spreading. Flowers either solitary in the leaf-axils or else in cymes. Sepals 4—5. Petals rarely none, emarginate or 2-cleft or 2-parted, white (ours). Stamens 10 or fewer, hypogynous. Ovary 1-celled; styles usually 3, rarely 4—5, usually opposite the sepals. Capsule globose or ovoid or oblong, opening by twice as many valves as there are styles. Seed several or many. (L. *stella*=a star; referring to the star-shaped flowers.)

- A. Lower leaves petiolate.

- B. Pubescence of stem scattered; styles 5; petals always present. W.

S. aquatica Scop. (Water Chickweed)

- BB. Pubescence of stem a line of hairs; styles 3—4; petals always present. W. E.

S. media Cyr. (Common Chickweed)

- BBB. Pubescence of stem none except at base; styles 3—4; petals sometimes none.
W. C. E. *S. nitens* Nutt. (Shining Chickweed)

- AA. Leaves all sessile or nearly so.

- C. Petals bifid to the middle or less, always present.

- D. Stem smooth except for a puberulent line. E.

S. oxyphylla Rob.

- DD. Stem glandular pubescent at least above. E. (*A. jamesii*.)

S. jamesiana Torr.

- CC. Petals bifid nearly to the base.

- E. Inflorescence-bracts small, scarious.

- F. Petals equaling or exceeding the calyx, always present.

- G. Cymes few-flowered; pedicels erect. W. C. E. (*S. longipes laeta*.)

S. longipes Gold.

- GG. Cymes diffuse; pedicels spreading.

- H. Leaves lanceolate, widest near the base; seed rough under hand-lens.
W. E. *S. graminea* L.

- HH. Leaves linear, widest near the middle; seed smooth under hand-lens.
W. E. *S. longifolia* Muhl. (Long-leaved Chickweed)

- FF. Petals none or much shorter than the calyx.

- I. Pedicels grouped in somewhat umbel-like clusters; capsule 6—8 mm. long.
E. (*A. baicalensis*.)

S. umbellata Turcz. (Umbel Chickweed)

- II. Pedicels scattered, not in somewhat umbel-like clusters; capsule 3—4 mm. long. (See J.)

EE. Inflorescence-bracts foliaceous.

J. Leaves lanceolate. W. C. E. (*A. borealis alpestris*; *A. brachypetala*; *A. simcoeii*; *A. calycantha*; *A. uliginosa* for our region.)

S. borealis Bigel. (Northern Chickweed)

JJ. Leaves ovate.

K. Sepals obtuse, hardly at all scarious-margined; petals none. W. E.

S. obtusa Engelm.

KK. Sepals acute, scarious-margined.

L. Petals exceeding the calyx, always present. W.

S. humifusa Rottb.

LL. Petals exceeded by the calyx, sometimes none.

M. Stem glabrous; sepals lanceolate; petals minute or none. W. C.

E. *S. crispa* C. & S.

MM. Stem pubescent, sepals ovate; petals none. W. C.

S. washingtoniana Rob.

CERASTIUM

MOUSE-EAR

Annual or perennial, mostly pubescent or hirsute. Flowers white, in dichotomous terminal cymes. Sepals 5, rarely 4. Petals emarginate or bifid or rarely entire, rarely none. Stamens 10, rarely fewer. Styles as many as the sepals and opposite them, or fewer. Capsule cylindric, 1-celled, often curved, opening by twice as many teeth as there are styles. Seeds many, rough, more or less flattened. (Gk. *keras*=a horn; referring to the shape of the pod.)

A. Petals not longer than the sepals, always present; pod 1—1¾ times as long as the calyx.

B. Perennial, flowering in summer and fall; pedicels longer than the calyx. W. E.

C. vulgatum L. (Common Mouse-ear)

BB. Annual, flowering in spring; pedicels not longer than the calyx. W. C. E.

(*C. brachypodium*.) *C. viscosum* L. (Spring Mouse-ear)

AA. Petals decidedly longer than the sepals, rarely none.

C. Flowers 12—21 mm. wide; perennial. W. C. E. (*C. arvense angustifolium*;

C. pilosum of How. Fl.; *C. elongatum*.)

C. arvense L. (Field Mouse-ear)

CC. Flowers 4—6 mm. wide.

D. Annual; leaves 12—37 mm. long; calyx not scarious-margined nor hairy. E.

(*C. longipedunculatum*.)

C. nutans Raf. (Powder-horn)

DD. Perennial; leaves 8—10 mm. long; calyx scarious-margined, hairy. W. C.

E. (*C. alpinum* for our region.)

C. beeringianum C. & S.

SAGINA (Alsinella)

PEARLWORT

Annual or perennial, tufted or matted, low. Leaves subulate or reniform; stipules none. Flowers small, whitish, pedicelled, terminal. Sepals 4—5. Petals sometimes none, entire or emarginate. Stamens as many as the sepals or fewer or twice as many. Ovary 1-celled; styles as many as the sepals and alternate with them. Capsule 4—5-valved, opening at base; valves opposite the sepals, entire. Seeds many. (L. *sagina*=fattening; and it was first the name of *Spergula*.)

A. Herbage glabrous.

- B. Annual; stems decumbent, several-flowered, the lower flowers lateral; flowers 1—3 mm. wide. W. C. E.

S. occidentalis Wats.

- BB. Perennial; stems either erect or else with a single terminal flower; flowers 3—5 mm. wide.

- C. Stems decumbent, filiform, 1-flowered, the flower terminal; pedicels at length nodding. C. E. *S. saginoides* Brit.

- CC. Stems erect, somewhat fleshy, several-flowered, the lower flowers lateral; pedicels remaining straight. W.

S. crassicaulis Wats.

- AA. Herbage glandular-puberulent; annual. W.

S. ciliata Pip. (Hairy Pearlwort)

ARENARIA

SANDWORT

Annual or perennial, mostly low, often tufted. Leaves sessile in most species, often rigid, ovate to subulate; stipules none. Flowers small, white, solitary or in cymes; cymes paniculate or head-like. Sepals 4—5. Petals rarely none, entire to 2-lobed. Stamens twice as many as the sepals. Styles 2—5, 3 in most, opposite the sepals. Capsule globose to oblong, opening by as many valves as there are styles; valves entire or 2-cleft. Seeds few to many, laterally compressed or reniform-globose. (L. arena=sand; referring to the habitat of many species.)

- A. Disk of the receptacle conspicuous, 8—10-lobed; seed without strophiole; petals present or none; leaves oblong or wider, not rigid.

- B. Leaves entire; calyx-lobes about 7 mm. long, about the same length as the petals; along sandy seashores. W. (*Ammodenia peploides*.)

A. peploides L. (Seashore Sandwort)

- BB. Leaves crenulate; calyx-lobes about 2 mm. long, twice as long as the petals; in salt marshes. W. (*Ammodenia peploides major*; *Ammodenia sitchensis*.)

A. sitchensis Dietr.

- AA. Disk of the receptacle none.

- C. Seed with strophiole; leaves soft, linear to ovate; petals always present.

- D. Stem terete; leaves oblong or oval, widest about the middle; sepals obtusish, shorter than the petals. W. E. (*Moehringia lateriflora*.)

A. lateriflora L. (Blunt Sandwort)

- DD. Stem angled; leaves lanceolate, widest below the middle; sepals acuminate, longer than the petals. W. C. E. (*Moehringia macrophylla*.)

A. macrophylla Hook. (Large-leaved Sandwort)

- CC. Seed without strophiole; leaves more or less rigid and subulate; petals sometimes none.

- E. Leaves elliptic-lanceolate or ovate.

- F. Perennial; leaves 8—12 mm. or more long, crenulate; petals about as long as the sepals. W. C.

A. physodes Fisch.

- FF. Annual; leaves 4—8 mm. long, entire; petals $\frac{2}{3}$ as long as the sepals.

- G. Leaves ovate; capsule flask-shaped, firm in texture. W.

A. serpyllifolia L. (Thyme-leaved Sandwort)

- GG. Leaves lanceolate; capsule subcylindric, papery in texture. W. (*A. serpyllifolia tenuor*.)

A. leptoclados Guss.

- EE. Leaves linear.

- H. Petals equaling or exceeding the sepals.

- I. Leaves 12—25 mm. or more long.
 - J. Leaves prickly-pointed; valves of the capsule 2-toothed or -cleft.
 - K. Sepals obtuse, broadly ovate; petals obovate; flowers in loose cymes. W. C. E. (*A. capillaris nardifolia*; *A. capillaris formosa*; *A. formosa*.) *A. capillaris* Poir.
 - KK. Sepals acute or acuminate, ovate or ovate-lanceolate.
 - L. Plant not glaucous; leaves ciliolate-serrate at base; petals narrowly oblong.
 - M. Stem smooth; flowers in dense clusters. E. *A. congesta* Nutt.
 - MM. Stem glandular or puberulent-glandular; flowers in loose clusters. E. (*A. congesta subcongesta*; *A. burkei*; *A. salmonensis*; apparently *A. uintahensis*.) *A. glabrescens* Pip.
 - LL. Plant decidedly glaucous; flowers in loose clusters.
 - N. Petals elliptic-ob lanceolate, $1\frac{1}{2}$ —2 times as long as the sepals; leaves not ciliolate at base. E. *A. aculeata* Wats.
 - NN. Petals obovate, not over $1\frac{1}{4}$ times as long as the sepals; leaves ciliolate or not at base. E. *A. fendleri* Gray
 - JJ. Leaves not prickly-pointed; valves of the capsule entire.
 - O. Stem either glandular-pubescent, or else leafy to the top; leaves not fascicled in the axils of the stem-leaves; sepals veinless or 1-veined or obscurely 3-veined.
 - P. Plant glabrous, in swamps; leaves acute. W. *A. paludicola* Rob.
 - PP. Plant glandular-pubescent, on dry hillsides; leaves either obtuse or hair-pointed.
 - Q. Leaves hair-pointed; flowers 3—10 mm. wide; sepals plainly or obscurely veined; petals obovate; seed margined, much flattened. W. *A. douglasii* Fenzl.
 - QQ. Leaves obtuse; flowers 5—6 mm. wide; sepals veinless; petals oblong; seed not margined, not flattened. W. *A. howellii* Wats.
 - OO. Stem glabrous, and leafy nearly to the middle; leaves conspicuously fascicled in the axils of the stem-leaves; sepals prominently 3-veined. W. *A. stricta* Michx. (Rock Sandwort)
 - II. Leaves 2—11 mm. long.
 - R. Stem pubescent or puberulent, or at least the pedicels so.
 - S. Annual; sepals either veinless or acuminate.
 - T. Leaves obtuse; sepals veinless. W. *A. howellii* Wats.
 - TT. Leaves attenuate to a hair-point; sepals strongly 3-veined. W. *A. tenella* Nutt.
 - SS. Perennial; sepals plainly 1—3-veined and obtuse.
 - U. Petals spatulate, $1\frac{1}{2}$ times as long as the sepals. C. E. *A. sajanensis* Willd.
 - UU. Petals broadly obovate, 2 or more times as long as the sepals. W. *A. arctica* Stev.

- RR. Stem and pedicels glabrous.
 V. Leaves 2—4 mm. long, somewhat fleshy, lanceolate; sepals acute.
 W. *A. californica* Brew.
 VV. Leaves longer, not fleshy, subulate-setaceous; sepals acuminate.
 W. *A. stricta* Michx. (Rock Sandwort)
 HH. Petals none, or exceeded by the sepals.
 W. Flower-clusters dense; sepals 8—12 mm. long, 1-veined. E.
A. franklinii Dougl.
 WW. Flower-clusters not dense; sepals 2—5 mm. long.
 X. Annual; leaves 2—4 mm. long; petals none or minute. E.
A. pusilla Wats.
 XX. Perennial; leaves 4—8 mm. long; petals present, not minute.
 Y. Leaves flat, 3-veined; sepals ovate-oblong, 3—3.5 mm. long, exceeded by the capsule. W. C. (*A. verna propinqua*; *A. verna hirta*; *A. verna rubella*; *A. aequicaulis*.)
A. propinqua Rich.
 YY. Leaves subulate, 1-veined; sepals lanceolate, 4—5 mm. long, exceeding the capsule. E.
A. nuttallii Pax.

SPERGULA

SPURRY

Annual, branched. Leaves apparently subulate and in dense whorls; stipules present. Flowers white, in terminal cymes. Sepals 5. Petals entire. Stamens 5 or 10. Styles 5, alternate with the sepals. Valves of the capsule 5, opposite the sepals. Seed compressed, acute-margined or winged. (L. spargare—to scatter; the seed is widely sown with grains.) W. E. *S. arvensis* L. (Corn Spurry)

TISSA (Spergularia)

SAND-SPURRY

Annual or perennial. Leaves fleshy in most, linear or setaceous, often clustered in the axils; stipules scarious. Flowers small, whitish or pink, in terminal bracted or leafy cymes or racemes. Sepals 5. Petals none or entire. Stamens 2—10. Ovary 1-celled, styles 3. Pod 3-valved at base. Seeds many, reniform-globose or compressed, smooth, winged or tuberculate. (A Latin name of unknown meaning.)

- A. Plants of saline soils; leaves very fleshy.
 B. Perennial; roots large; leaves 1.6—5 cm. long; mature capsules 4—5 mm. in diameter. W. *T. macrotheca* Brit. (Large Sand-spurry)
 BB. Annual; roots fibrous; leaves 0.4—2.5 cm. long; mature capsules less than 4 mm. in diameter. W. (*T. sparsiflora*; *T. salina* for our region.)
T. marina Brit. (Salt-marsh Sand-spurry)
 AA. Plants not of saline soils; leaves not fleshy.
 C. Stipules ovate-lanceolate, 4—6 mm. long; stamens usually 5. W. E. (*T. rubra perennans*.) *T. rubra* Brit. (Pink Sand-spurry)
 CC. Stipules deltoid, shorter; stamens mostly 2—3. E.
T. diandra Brit.

ILLECEBRACEAE

Knotwort Family

Herbs, perennial, low, densely tufted. In ours leaves mostly opposite, mostly entire, subulate, densely crowded; stipules scarious (ours). Flowers sessile, in axillary clusters. Calyx 4—5 (ours)-toothed or -parted (ours), herbaceous or coriaceous, persistent. Petals none or minute (ours) and scale-like. Stamens 3—5 (ours 5), on the

calyx, as many as the calyx-lobes and opposite them or fewer. Ovary 1-celled; styles 2, often united. Fruit a utricle. Seed 1.

PENTACAENA**THORNY SANDWORT**

Leaves very prickly-pointed; stipules silvery. Sepals hooded, unequal, terminating in a short divergent spine, the inner more shortly awned. Style very short, bifid. Utricle enclosed in the rigid calyx. On sand near the seashore. (Gk. pente=5, kainis=a knife; referring to the 5 sharp-pointed sepal-spines.) W.

F. ramosissima Hook.

NYMPHAEACEAE**Water-lily Family**

Herbs, aquatic, perennial; rhizomes horizontal. Leaves large, floating or immersed, or rarely emersed. Sepals 3—12. Petals 3—many. Stamens 5—many. Carpels 3—many, distinct or united or immersed in the receptacle (not ours); stigmas distinct or united into a radiate or ring-like disk; ovules 1—many. Fruits indehiscent, separate or united. Seed enclosed in a pulpy aril or without it.

A. Leaves peltate, on an elongated stem; flowers 1—2 cm. wide; carpels distinct; pistils 4—18, not dehiscent. **BRASENIA** (p. 161)

AA. Leaves not peltate, all basal; flowers 2.5—13.7 cm. wide; carpels united into a single dehiscent pistil.

B. Sepals 4, flat; petals 2—3.5 cm. long, white or pinkish, epigynous.

CASTALIA (p. 161)

BB. Sepals 8—12, concave; petals 1—1.5 cm. long, yellow, hypogynous.

NYMPHAEA (p. 161)

BRASENIA**WATER-SHIELD**

Covered with gelatinous matter except the upper leaf-surfaces. Stem slender, several feet long, branching. Leaves alternate, oval, entire, 5—10 cm. long, long-petioled, centrally peltate, floating, palmately veined. Flowers axillary, purple. Sepals 3. Petals 3—4, linear. Stamens 12—18; filaments thread-like. Carpels 4—18, separate. Ovules 2—3. Ripe carpels coriaceous, 1—2-seeded. (Origin?) W. E.

B. schreberi Gmel.

CASTALIA**WATER-LILY**

Leaves basal, floating, rounded-cordate. Flowers white or pink. Sepals 4. Petals many, imbricated in many rows, inserted on the ovary, gradually passing into stamens. Stamens many, the outer with large petal-like filaments and short anthers, the inner with linear filaments and elongated anthers. Carpels many, united; stigmas linear, radiating. Fruit globose, covered with the bases of the petals, ripening under water. (Gk. kastalia—a mythical fountain on Mt. Parnassus.)

A. Leaves oval; flowers 7.5—13.7 cm. wide, not fragrant. E. (*C. leibergii*.)

C. tetragona Law. (Small White Water-lily)

AA. Leaves orbicular; flowers 2.5—5 cm. wide, fragrant. W.

C. odorata W. & W. (Sweet White Water-lily)

NYMPHAEA**YELLOW POND-LILY**

Rhizome 2—15 cm. thick. Leaves large, basal, floating or emersed, cordate, with a deep sinus. Flowers showy, yellow or sometimes purplish. Sepals 5—12, concave, thick. Petals many, small, stamen-like, hypogynous. Stamens many. Carpels

many, many-ovuled, united; stigma disk-like, 8—24 radiate. Fruit ovoid, naked. (The white ones were dedicated by the Greeks to the water nymphs.) W. C. E. (*N. ad-vena* for our region.) *N. polysepala* Gr.

CERATOPHYLLACEAE Hornwort Family

Herbs, perennial, aquatic, submerged; stems slender, widely branching. Leaves whorled, in ours thread-like or stag-horn-like. Flowers monoicous or dioicous, sessile, solitary in the axils. Perianth many-parted; segments entire or toothed. Stamens numerous; anthers extrorse, the connective prolonged into a thick appendage beyond the sacs. Ovary superior, 1-celled, 1-ovuled.

CERATOPHYLLUM

HORNWORT

Stem densely leafy at least above (ours). Terminal tuft of leaves slimy and persisting thru the winter. Leaves spinulose-serrate or smooth, forked. Sterile flowers with 10—20 stamens. Fruit beaked with the long persistent style. (Gk. *keras*=a horn, *phyllon*=a leaf; the leaves branch stag-horn-like.) W. E.

C. demersum L.

RANUNCULACEAE

Buttercup Family

Herbs or shrubs, annual or perennial, climbing when shrubby (ours), glabrous or pubescent with simple hairs; juice acrid. Leaves alternate or opposite (*Clematis*) or the stem with a single whorl (*Anemone*), simple or compound; stipules none, but the base of the petiole often clasping or sheathing. Flowers regular or irregular. Sepals 3—15, often petal-like, imbricated (except in *Clematis*). Petals of about the same number as the sepals, rarely more, rarely none. Stamens 10—many, hypogynous. Carpels 1—many, 1-celled; ovules 1—many. In fruit the carpels becoming akenes or follicles or berries.

A. Leaves either alternate or all basal.

B. Flowers spurless or 1-spurred; leaves various.

C. Flowers regular; leaves various.

D. Leaves simple.

E. Leaves entire; fruit of 1-seeded akenes.

MYOSURUS (p. 168)

EE. Leaves either not entire, or else fruit of several-seeded follicles.

F. Petals none.

G. Leaves entire or crenate; sepals 5—15; fruit of follicles; follicles several-seeded, not 4-angled.

CALTHA (p. 163)

GG. Leaves palmately lobed; sepals 4; fruit of akenes; akenes 1-seeded, 4-angled.

TRAUTVETTERIA (p. 168)

FF. Petals present.

H. Plants glabrous; petals 15—25; fruit of many-seeded follicles.

TROLLIUS (p. 164)

HH. Plants either pubescent or petals fewer; fruit of 1-seeded akenes.

I. Flowers white; stems submerged; leaves filiform when submerged; akenes transversely rugose; petals with a naked spot or pit at base.

BATRACHIUM (p. 169)

II. Flowers yellow; stems mostly not submerged; rarely the leaves filiform; akenes not transversely rugose; petals with a small scale at the base of the claw.

RANUNCULUS (p. 169)

DD. Leaves compound.

J. Petals not red; flowers often small; fruit of follicles or akenes, or a red berry.

K. Fruit of akenes, these each 1-seeded.

L. Petals present; leaves rarely ternately more than 1-compound; inflorescence either not panicles nor racemes, or else flowers large; flowers perfect. (See HH.)

-LL. Petals none; leaves ternately 2—3-compound; inflorescence panicles or racemes; flowers small, mostly not perfect.

THALICTRUM (p. 171)

KK. Fruit of follicles or berries, these each several-seeded.

M. Fruit of follicles; carpels 2 or more (except sometimes in *Cimifuga elata*).

N. Leaves withering in the fall, not all basal; follicles sessile or short-stalked, in heads.

O. Stems 9—24 dm. high, many-flowered. CIMIFUGA (p. 165)

OO. Stems 0.5—3 dm. high, 1- to several-flowered.

ISOPYRUM (p. 164)

NN. Leaves green thruout the winter, all basal; follicles long-stalked, in umbels.

COPTIS (p. 164)

MM. Fruit a red berry; carpel 1.

ACTAEA (p. 164)

JJ. Petals red; flowers large; fruit of many-seeded follicles.

PAEONIA (p. 163)

CC. Flowers irregular; leaves palmately-lobed or -cleft or -divided.

P. Upper sepal spurred.

DELPHINIUM (p. 165)

PP. Upper sepal arched into a hood.

ACONITUM (p. 167)

BB. Flowers regular; petals 5, each with a long tubular spur; leaves ternately 1—3-compound.

AQUILEGIA (p. 165)

AA. Stem-leaves opposite or whorled.

Q. Stem herbaceous, erect; stem-leaves in a single whorl of 2—3.

R. Style short, glabrous or pubescent, not plumose.

ANEMONE (p. 167)

RR. Styles long, filiform, becoming plumose.

PULSATILLA (p. 167)

QQ. Stem often woody, erect or viney; stem-leaves more than 3, opposite; style plumose.

CLEMATIS (p. 168)

PAEONIA

PEONY

Herbs (ours) or low shrubs; roots tuberous. Leaves alternate, ternately 3-compound (ours) or -divided. Flowers large, solitary, terminating the stems or branches. Sepals 5, strongly imbricated, persistent. Petals 5—10, or none, on a fleshy disk that is adnate to the sepals. Stamens many. Carpels few; style short or none. Fruit of follicles. Seeds many, oval or oblong. (Honor of Paeon, a Greek physician.) E.

P. brownii Dougl.

CALTHA

MARSH MARIGOLD

Herbs, glabrous. Leaves mostly basal, cordate or reniform, simple, entire or crenate. Flowers white or yellow or pink. Sepals 5—15, petal-like, large, deciduous. Petals none. Stamens many. Pistils 5—15, sessile. Fruits of follicles. Seeds several. Marsh plants. (Gk. *kalathos*—a goblet; referring to the form of the flower.)

A. Stem decumbent, several-leaved; flowers yellow; follicles sessile. W.

C. palustris L.

AA. Stem erect, scapose or 1-leaved; flowers white or purplish; follicles more or less stalked.

B. Leaf-blades wider than long, reniform-orbicular; sepals lanceolate, acute. W. C. E. (*C. rotundifolia*.) *C. leptosepala* DC.

BB. Leaf-blades longer than wide, roundish to oblong-cordate; sepals oblong to spatulate, obtuse. W. C. *C. biflora* DC.

TROLLIUS

GLOBE-FLOWER

Herbs, perennial, glabrous, erect or ascending. Leaves palmately-lobed or -dissected. Flowers solitary or few, lilac or yellow (ours). Sepals 5—many (ours 5—7), petal-like, regular, deciduous. Petals 5—many (ours 15—25), small, 1-lipped, tubular at base, linear, shorter than the stamens. Stamens many. Pistils 5—many. Follicles sessile, somewhat cylindric, about 3 mm. long (ours). Seeds many, oblong, smooth. (German *trol*=something round; referring to the form of the flowers.) W. C. E.

T. laxus Salisb. (Spreading Globe-flower)

ISOPYRUM

FALSE-RUE

Herbs, perennial, low, smooth. Leaves mostly alternate (so in ours), ternately 2—3-compound. Flowers white, solitary or in lax terminal racemes or panicles or cymes. Sepals 5—6, petal-like, regular, deciduous. Petals none or very small, nectariferous. Stamens 10—40. Follicles 2—20. Seed 2—several, smooth or slightly rugose. (Gk. *isopyron*=the name of some *Fumaria*.)

A. Stem 0.5—1 dm. high, 1-flowered; sepals oblong, 6 mm. long; follicles short-stalked. W. *I. stipitatum* Gray (Small False-rue)

AA. Stem 3—9 dm. high, several-flowered; sepals obovate, 8 mm. long; follicles sessile. W. *I. hallii* Gray (Tall False-rue)

COPTIS

GOLD-THREAD

Herbs, perennial, low, glabrous; rootstalks slender, creeping, yellow, bitter. Leaves all basal, ternately-compound (ours) or -divided, lasting over winter. Flowers white, solitary or few, on naked scapes. Sepals 5—7, petal-like, deciduous, white or greenish. Petals 5—6, small, linear, cucullate. Stamens 10—25. Carpels stipitate, 3—12. Follicles 3—12, stalked, in umbels. Seeds several, smooth, shining. (Gk. *kopto*=to cut; from the divided leaves.)

A. Leaflets obscurely 3-lobed; scape 1-flowered; sepals oval or oblong, obtuse; petals enlarged at the summit. W. C. E.

C. trifolia Salisb.

AA. Leaflets rather deeply lobed or yet more deeply segmented; scape 1—3-flowered; sepals linear or ligulate, attenuate; petals enlarged near the middle.

B. Leaves ternate.

C. All 3 leaflets long-petioluled; leaf-divisions obtuse, obtusely dentate; seed oblong. C. E. (*C. venosa*.)

C. occidentalis T. & G.

CC. Middle leaflet long-petioluled, lateral short-petioluled; leaf-divisions acute, acutely dentate; seed oval. W. C.

C. laciniata Gray

BB. Leaves pinnately 5-foliolate. W.

C. asplenifolia Salisb.

ACTAEA

BANE BERRY

Herbs, perennial, tall. Leaves alternate, ternately 3-compound. Flowers small, white, in short terminal racemes. Sepals 5—6, nearly equal, petal-like. Petals 4—10,

or none, less showy than the stamens. Stamens many; filaments white, showy. Carpel 1, sessile; stigma wide, 2-lobed, covering the carpel. Fruit a berry, red (ours) or white. Seeds many, smooth, flat. (From Gk. *aktea*=an old name for the Elder.)

A. Leaf-teeth sharp, acuminate. W. C. E. (*A. spicata arguta*.)

A. arguta Nutt.

AA. Leaf-teeth rounded or mucronate. E.

A. rubra Willd.

CIMIFUGA

BUGBANE

Herbs, perennial, tall. Leaves ternately compound, large. Flowers small, white, in paniced racemes. Sepals 4—6, falling soon after the flower opens. Petals 0—8, small, with short claws. Stamens many. Follicles 1—8. Seeds many. (L. *cimex*=bug, *fugere*=to drive away; its odor drives insects away.)

A. Petals none; staminodia 1—2 or more; follicles 1—3, not stalked. W.

C. elata Nutt.

AA. Either petals or staminodia present, 1—5; follicles 3—5 or more, stalked. C.

C. laciniata Wats.

AQUILEGIA

COLUMBINE

Herbs, perennial, usually glaucous; stems mostly paniculately branched. Leaves 1—3-ternate; leaflets roundish, obtusely lobed. Flowers terminal, showy. Sepals 5, petal-like. Petals 5, with short spreading lips which are produced backward into the long tubular spurs. Stamens many, outer long-exserted, inner merely thin scales. Follicles 5, sessile, pointed with the slender style. (L. *aquila*=an eagle; referring to the talon-like spurs of the flowers.)

A. Flowers red to yellow, pendulous when open; spurs 3.1 cm. or less long.

B. Petal-blade from half to as long as the spur.

C. Flowers containing both red and yellow. W. C. E.

A. formosa Fisch.

CC. Flowers containing yellow only. E. (*A. flavescens*.)

A. formosa flavescens (Wats.)

BB. Petal-blade very short or none. W.

A. truncata F. & M.

AA. Flowers white to bluish, erect or ascending when open; spurs 3.7—7 cm. long.

D. Flowers almost white, slightly bluish. E.

A. coerulea leptocera Nels. (White Columbine)

DD. Flowers bluish, somewhat yellowish on lobes and spurs. E.

A. oreophila Rydb. (Blue Columbine)

DELPHINIUM

LARK-SPUR

Herbs, erect, annual or perennial. Leaves alternate, palmately-lobed or -cleft or -divided. Flowers showy, in racemes or panicles. Sepals 5, very irregular, usually colored and petal-like; upper sepal produced backward at base forming a spur. Petals 2 or 4, small, very irregular; 2 upper petals produced backward and enclosed in the sepal-spur. Stamens many. Petals 1—5, sessile. Style persistent. Fruits of follicles. Seeds many. (Gk. *delphin*=a dolphin; from a slight resemblance of the flower.)

A. Flowers white or green or blue.

B. Most of the pedicels shorter than the flowers and the fruit.

- C. Flowers blue or purplish.
 - D. Roots fasciculate, elongate, not tuber-like.
 - E. Leaves 5—7.5 cm. wide; stem 3—18 dm. high.
 - F. Leaf-segments laciniately many-parted, the lobes linear. C. E. (*D. scopulorum stachydeum*.)
 - D. scopulorum* Gray
 - FF. Leaf-segments 5—9, the segments and their divisions oblong to obovate-cuneate.
 - G. Mature follicles viscid-pubescent. E.
 - D. reticulatum* Nels.
 - GG. Mature follicles glabrous.
 - H. Inflorescence glabrous. E. (*D. glaucum*.)
 - D. scopulorum glaucum* Gray
 - HH. Inflorescence tawny-pubescent and somewhat viscid. E. (*D. subalpinum*.)
 - D. scopulorum subalpinum* Gray
 - EE. Leaves 2.5—5 cm. wide; stem 3—6 dm. high. E.
 - D. andersoni* Gray
 - DD. Roots thickened, forming irregular tubers.
 - I. Plant pubescent thruout. E. (*D. oreganum*.)
 - D. simplex* Dougl.
 - II. Plant glabrous or nearly so. E. (*D. simplex distichiflorum*; *D. burkei*.)
 - D. distichum* Gey.
 - CC. Flowers greenish. E.
 - D. viridescens* Leib.
 - BB. Most of the pedicels longer than the flowers and the fruit.
 - J. Mature follicles 6.5—12.5 mm. long.
 - K. Stem 1—7-flowered, only 1—3-leaved. C. E. (*D. nuttallianum*.)
 - D. depauperatum* Nutt.
 - KK. Stems many-flowered, more than 3-leaved.
 - L. Stem glabrous or nearly so; sepals $\frac{2}{3}$ as long as the spur. W. C. E.
 - D. columbianum* Gr.
 - LL. Stem puberulent or hirsute-pubescent below; sepals about as long as the spur. W. (*D. leucophaeum*.)
 - D. hesperium* Gray
 - JJ. Mature follicles 13—25 mm. long.
 - M. Plant pubescent, 1.5—6 dm. high. W. C. E. (*D. pauperculatum*.)
 - D. menziesii* DC.
 - MM. Plant glabrous or only the inflorescence hairy.
 - N. Plant 1.5—3 dm. high; leaves rarely over 2.5—5 cm. wide; leaf-segments obtuse. W. C. E.
 - D. bicolor* Nutt.
 - NN. Plant 6—18 dm. high; leaves often 10—15 cm. wide; leaf-segments acute. W. E.
 - D. trolliifolium* Gray (Poison Lark-spur)
 - AA. Flowers scarlet or orange.
 - C. Flowers pale yellow. E.
 - D. xantholeucum* Pip.
 - OC. Flowers red. W. C.
 - D. nudicaule* T. & G.

ACONITUM

WOLFBANE

Herbs, perennial, tall. Leaves alternate, palmately lobed. Flowers showy, in open racemes. Sepals 5, colored, petal-like, very irregular, the upper ones arched into a hood. Petals 2—5; 2 upper irregular, with long claw, with spur-like blade, concealed in the hood of the sepals; 3 lower small or obsolete. Follicles 3—5, sessile. Seeds many. (Greek name is akonitos; said to be from the town Acone in Asia Minor, where it was found.)

A. Stem stout, not viney; upper leaves without bulblets in their axils. C. E.

A. columbianum Nutt.

AA. Stem weak, viney; upper leaves with bulblets in their axils. E.

A. bulbosum How.

ANEMONE

ANEMONE

Herbs, perennial, erect. Leaves lobed or divided or compound, all radical except those of the involucre. Sepals 4—20, colored and petal-like. Petals none. Style short, glabrous or pubescent, not plumose; stigma lateral. Akenes numerous, compressed, pointed. (Gk. anemos=the wind; from the exposed habitats.)

A. Akenes naked or merely pubescent.

B. Involucre-leaves petioled.

C. Involucre-leaves 3—5-foliolate; stems from a horizontal rhizome.

D. Flowers 20—35 mm. wide, white. W. C. E. (*A. trifoliata* for our region.)

A. quinquefolia L. (Wood Anemone)

DD. Flowers 8—12 mm. wide.

E. Sepals white or pale-blue. W.

A. lyallii Brit.

EE. Sepals bright-blue. C. E.

A. oregana Gray

CC. Involucre-leaves 2—3 times dissected; stems from an erect caudex. E.

A. tetonensis Port.

BB. Involucre-leaves sessile.

F. Basal leaves 3-foliolate; leaflets ovate or rhombic-ovate; akenes wingless. W. C.

A. deltoidea Hook. (3-leaved Anemone)

FF. Basal leaves 3-parted or -divided; leaf-lobes narrowly lanceolate or linear; akenes wing-margined. E.

A. narcissiflora L.

AA. Akenes densely long-woolly.

G. Plants glabrate; sepals not yellowish, blue. W. C. E.

A. drummondii Wats.

GG. Plants villous-pubescent; sepals yellowish, sometimes tinged with blue. W. E. (*A. hudsoniana*; *A. lithophylla*.)

A. multifida Poir. (Cut-leaved Anemone)

PULSATILLA

PASQUE FLOWER

Herbs, perennial, erect. Leaves lobed to compound, all basal except those of the involucre. Sepals 4—20, colored and petal-like. Petals none. Styles long, filiform, becoming plumose. Akenes numerous, flattish, ending in a long feathery tail. (Dinutive of L. pulsare—to beat or pulse. Why?) W. C. E. (*Anemone occidentalis*.)

P. occidentalis Freyn

CLEMATIS

CLEMATIS

Perennial, more or less woody, either climbing vines or else erect or ascending herbs. Leaves opposite, simple or compound, entire or lobed; compounding pinnate or ternate; petioles slender, serving as tendrils. Sepals 4—5, petal-like. Petals none or shorter than the sepals. Stamens many. Akenes many; styles long, persistent, plumose or silky or naked (not ours). (Gk. klemma—a tendril; the petioles coil tendril-like.)

A. Herbs, erect.

B. Petiolules all straight; leaf-segments linear to lanceolate. E. (*C. hirsutissima*.)
C. douglasii Hook. (Sugar-bowls)

BB. Petiolules of some of the leaflets contorted as if for climbing; leaf-segments oblong to ovate-lanceolate. E. *C. scottii* Port. (Scott's Clematis)

AA. Shrubby, climbing vines.

C. Flowers white, cymose-paniculate; sepals 8—13 mm. long; leaves pinnately 5—7-foliolate.

D. Akenes silky-pubescent with straight hairs. E. (*C. brevifolia*.)
C. ligusticifolia Nutt. (Virgin Bower)

DD. Akenes woolly-pubescent with crinkly hairs. E.
C. suksdorfii Rob.

CC. Flowers blue, solitary; sepals 25—50 mm. long; leaves 3-foliolate.

E. Leaves ternate, entire or merely toothed. E. (*C. columbiana*; *C. verticillaris*.)
C. occidentalis Hornm.

EE. Leaves biternate, incisely toothed or lobed. C. E. (*C. alpina occidentalis*;
C. pseudoalpina; *C. ochotensis*.)
C. alpina Mill.

MYOSURUS

MOUSE-TAIL

Herbs, annual, small. Leaves linear or linear-spatulate, entire, basal. Flowers solitary, on simple scapes. Sepals 5—6, spurred at base. Petals 0 or 5—6, with long claws, with a pit at tip, greenish-yellow. Stamens 5—25. Akenes many, with a prominent ridge, apiculate or aristate, on a slender or conical receptacle. (Gk. mys—a mouse, oura—a tail; referring to the long tail-like head of akenes.)

A. Carpels prominently beaked; carpel-spike 2—25 mm. long.

B. Carpel-spike sessile; petals always present; E.
M. sessilis Wats.

BB. Carpel-spike on a scape 2.5—5 cm. long; petals sometimes none. E.
M. apetalus Gay.

AA. Carpels obscurely beaked.

C. Carpel-spike 1—5 cm. long, 6 mm. or less thick; seed oblong. E.
M. apetalus lepturus Gray

CC. Carpel-spike shorter, thicker; seed oval.

D. Not a salt-marsh plant. W. E.
M. minimus L.

DD. Salt-marsh plant, mainly maritime. W.
M. major Gr.

TRAUTVETTERIA

FALSE BUGBANE

Herbs. Leaves alternate, palmately lobed. Flowers small, in terminal corymbose panicles. Sepals usually 4, concave, petal-like. Petals none. Akenes many, in a head, inflated, 4-angled. (Honor of E. R. von Trautvetter, a Russian botanist.) W. C. E.
T. grandis Nutt.

BATRACHIUM

WATER CROW-FOOT

Herbs, annual or perennial, aquatic or subaquatic. Submerged leaves filiform-dissected; emersed leaves when present with flat blade; petioles with dilated stipule-like base. Peduncles solitary, opposite the leaves. Petals white, with yellowish base, with naked pit at base. Akenes not margined, transversely rugose. (Gk. batrachos=a frog; on account of the aquatic habitat.)

- A. Leaves mostly submerged; styles not longer than the ovary.
- B. Some of the leaves commonly floating and not composed of filiform segments; leaf-segments 1—2.5 cm. long. W. C. E. (*Ranunculus aquatilis*.)
 - B. *aquatile* Wimm.
- BB. All the leaves composed of filiform segments; leaf-segments 2.5—5 cm. long. W. C. E. (*B. aquatile pantothrix*; *B. trichophyllum*; *B. aquatile caespitosum*; *B. flaccidum*.)
 - B. *aquatile trichophyllum* (Gray) (Ditch Crow-foot)
- AA. Leaves nearly all floating; styles about 3 times as long as the ovary. W.
 - B. *lobbii* Gray

RANUNCULUS

BUTTERCUP

Herbs, annual or perennial, mostly in wet places, sometimes aquatic. Leaves simple or compound, alternate, entire or lobed or divided or dissected, or palmately or ternately compound. Flowers yellow or red. Sepals 5, deciduous. Petals as many as the sepals or more, conspicuous or minute, with a scale at the base of the blade. Stamens several to numerous. Akenes many, smooth, hairy or spiny; style minute or elongated. (Diminutive of *L. rana*=a frog; on account of the common wet habitat.)

- A. Plants aquatic or subaquatic; leaves divided into filiform segments when submerged.
- B. Petals much exceeding the sepals; carpels margined toward the base with conspicuous tumid border. E. (*R. delphinifolius terrestris*.)
 - R. *delphinifolius* Torr. (Swamp Buttercup)
- BB. Petals not much exceeding the sepals; carpels without distinct border. W. C. E. (*R. limosus*.)
 - R. *purshii* Rich. (Pursh Buttercup)
- AA. Plants terrestrial but often of very wet places; leaves never dissected into filiform segments (except *R. sceleratus*).
- C. Leaves entire to crenate or dentate, not lobed nor more deeply separated into segments.
- D. Leaves ovate to cordate, coarsely crenulate or dentate.
- E. Leaves acute, dentate; mature akenes not veined on their faces. E.
 - R. *gormanii* Gr.
- EE. Leaves rounded at apex, crenate; mature akenes striate-veined on the faces. W. E. R. *cymbalaria* Pursh (Seaside Buttercup)
- DD. Leaves either narrower or else merely crenulate or denticulate.
- F. Stem creeping, rooting from the joints.
- G. Stem reclining or ascending, rooting at the lower joints only. W. C. E. (*R. flammula unalaskensis*; *R. unalaskensis*; *R. michrolonchus*; *R. samolifolius*.)
 - R. *flammula* L. (Smaller Spearwort)
- GG. Stem creeping, rooting at all joints. W. C. E. (*R. reptans*.)
 - R. *flammula reptans* Schl. (Creeping Spearwort)
- FF. Stem erect, not rooting from the joints.
- H. Leaves oblong-lanceolate; petals 8—13 mm. long. E. (*R. bolanderi*.)
 - R. *alismaefolius* Gey.

HH. Leaves ovate to cordate; petals 6—10 mm. long. C. E. (*R. alismellus*; *R. populago*.)

R. alismaefolius alismellus Gray

CC. Leaves or some of them lobed or yet more deeply separated into segments.

I. Faces of the akenes smooth or merely pilose; mostly perennials.

J. Plants glabrous or nearly so, 3 dm. or less high or long (except *R. scleratus* and *R. bongardii*.)

K. Basal leaves toothed or entire or 2—7-lobed for less than $\frac{1}{2}$ the distance to the base; stem-leaves 2—5-cleft or -parted.

L. Basal leaves 2—4-toothed or -lobed; carpels forming a globose head.

M. Blades of basal leaves widest above their middle; petals broadly obovate. E. (*R. ellipticus*.)

R. glaberrimus Hook.

MM. Blades of basal leaves widest below their middle; petals spatulate-oblong. E. (*R. digitatus*.)

R. jovis Nels.

LL. Basal leaves 5—9-lobed at apex; carpels forming an oblong or cylindric head. E.

R. eximius Gr.

KK. Both basal and stem-leaves parted or divided or compound.

N. Leaves ternately divided; the segments linear to linear-spatulate, 1—2 mm. wide. E. *R. triternatus* Gray

NN. Leaves not so in every particular.

O. Head of akenes globose.

P. Beak of the akene hooked.

Q. Segments of basal leaves again deeply lobed. (See D.)

QQ. Segments of basal leaves not again lobed. (See MM.)

PP. Beak of the akene without hook.

R. Petals 2—4 mm. long. W. E. (*R. eremogenes*.)

R. scleratus L. (Cursed Buttercup)

RR. Petals 8—13 mm. long. W. C.

R. suksdorfii Gray

OO. Head of akenes 2 or more times as long as wide.

S. Beak of akene not hooked.

T. Petals 2—4 mm. long; annual. (See R.)

TT. Petals 6—13 mm. long; perennial. W. C. E.

R. eschscholtzii Schl.

SS. Beak of akene hooked; petals 2—4 mm. long. C. E.

R. verecundus Rob.

JJ. Plants pubescent or hairy, usually 3—5 dm. or more high or long (except *R. parviflorus* and *R. cardiophyllus*).

U. Beak of akene not hooked.

V. Petals 5, 2—4 mm. long, not exceeding the calyx; plant erect. W.

E. *R. pennsylvanicus* L. (Bristly Buttercup)

VV. Petals 6 or more mm. long, exceeding the calyx.

W. Petals 5; beak of akene less than 2 mm. long.

X. Leaves not white-spotted; stem erect or ascending; plant without stolons.

Y. Plants glabrous or but little hairy. W.

R. oreganus How.

- YY. Plants very hairy. E. (*R. macounii*.)
R. oreganus macounii Pip. (Macoun Buttercup)
- XX. Leaves mostly white-spotted; stem prostrate; plant with stolons. W.
R. repens L. (Creeping Buttercup)
- WW. Petals 7—16; beak of akene 3—4 mm. long.
 Z. Leaf-segments linear to cuneate-obovate, 2—3-lobed or -toothed.
 W. E. (*R. maximus*.)
R. orthorhynchus Hook.
- ZZ. Leaf-segments oblong to ovate, 3-cleft or -parted and again 3—9-toothed. E. (*R. septentrionalis* for our region.)
R. platyphyllus Pip.
- UU. Beak of akene hooked.
 a. Petals 5.
 b. Petals 4—6 mm. long, less than $1\frac{1}{2}$ times as long as the sepals.
 c. Plants rather densely stiff-hairy; leaves not brown-blotched; akenes smooth on the faces. W. C. E. (*R. douglasii*; *R. arcuatus*.) *R. bongardii* Gr.
 cc. Plants glabrous to somewhat stiff-hairy; leaves mostly brown-blotched; akenes hispid on the faces. W. C. E. (*R. greenii*.)
R. bongardii greenii Pip. (Blotched Buttercup)
- bb. Petals 6—15 mm. long, at least twice as long as the sepals.
 d. Basal leaves coarsely crenate to 3—7-cleft, segments entire; stem-leaves palmately many-cleft, segments incisely crenate. E.
R. cardiophyllus Hook.
- dd. Basal leaves 3-parted, segments sometimes again 2—5-lobed; stem-leaves 3-parted, segments entire or 2—3-lobed. E.
R. ciliosus How.
- ddd. Basal leaves 3—5-cleft or -parted, segments 2—3-lobed; stem-leaves 3—5-parted or -divided; segments entire. W. (*R. eisenii*; *R. howellii*; *R. occidentalis rattanii*; *R. montanensis*.)
R. occidentalis Nutt. (Prairie Buttercup)
- aa. Petals 6—15. W.
R. californicus Benth.
- II. Faces of akenes scabrous or muriculate or echinate; annuals.
 e. Akenes hispid with hooked hairs; beak of akene hooked; plant pubescent. E.
R. hebecarpus H. & A. (Bur-seed Buttercup)
- ee. Akenes muriculate.
 f. Plant villous or hirsute; leaves 3—5-parted or -divided; petals not longer than the sepals; beak of akene hooked. W.
R. parviflorus L. (Small-flowered Buttercup)
- ff. Plant nearly glabrous; leaves 3—5-cleft; petals longer than the sepals; beak of akene not hooked. W.
R. muricatus L. (Rough-seeded Buttercup)

THALICTRUM

MEADOW-RUE

Herbs, perennial, erect, tall, usually smooth. Leaves alternate, ternately 2—3-compound. Flowers perfect or polygamous or dioicous, usually small, greenish-white, in panicles or racemes. Sepals 4—5. Petals none. Stamens many, exserted. Akenes

usually few, ribbed or veined. (Said to be from Gk. *thallo*=to become green; referring to the young shoots.)

A. Akene flat, two edged.

B. Flowers perfect; akenes half rhombic-ovate. C. E.

T. sparsiflorum Turcz.

BB. Flowers dioicous.

C. Akenes lanceolate, acuminate. W. C. E.

T. occidentale Gray

CC. Akenes ovate or oblong or orbicular, blunter.

D. Akenes few to numerous, 4—6 mm. long, ovate; seed-head usually not globular. W. E. *T. fendleri* Engelm.

DD. Akenes numerous, about 6 mm. long, obovate; seed-head dense, globular.

W. *T. polycarpum* Wats.

AA. Akenes terete or but slightly flat, ovate to short-oblong.

E. Leaves glabrous and glaucous; flowers dioicous. E.

T. venulosum Trel.

EE. Leaves obscurely glandular or waxy; flowers polygamous. E. (*T. dasycarpum*.)

T. purpurascens L.

BERBERIDACEAE

Barberry Family

Herbs or shrubs, perennial (ours). Leaves simple or compound, alternate, often all basal; stipules present or none. Flowers perfect, solitary or in racemes. *Sepals and petals generally imbricated in several sets. Stamens opposite the petals and as many as them; anthers extrorse, opening by valves* (ours). Pistil 1 (ours); style short, ovary superior. Fruit a berry or capsule. Seeds 2—many.

A. Herbs; leaves deciduous; ternately 1—3-compound, not spiny.

B. Leaf only 1; leaflets 3; flowers in a spike; sepals and petals none.

ACHLYS (p. 172)

BB. Leaves more than 1; leaflets more than 3 to a leaf; flowers in a panicle; sepals and petals present.

VANCOUVERIA (p. 172)

AA. Shrubs; leaves evergreen, pinnately 1-compound, spiny-toothed at margin.

BERBERIS (p. 173)

ACHLYS

VANILLA-LEAF

Herbs, glabrous. Leaf 1, basal, 3-foliolate. Flowers small, white, in a spike; spike naked, crowded, terminal, on a scape. Sepals none. Petals none. Stamens 9 or more, in 3 or more rows; filament slender, the outer dilated at the summit. Stigma sessile, dilated. Fruit at first somewhat fleshy, later dry and coriaceous, lunate-incurved; dorsally keeled. Seed 1. (Gk. *achlys*=mist; suggested by the flowers.) W. C.

A. triphylla DC. (Sweet-after-Death)

VANCOUVERIA

BARREN-WORT

Herbs, slender. Leaves ternately 2—3-compound. Flowers white or yellow, in racemes; racemes open, paniculate, on a naked scape; bracts of the raceme 6—9, oblong, membranous. Sepals 6, obovate, reflexed, falling with the bracts. Petals 6, shorter than the sepals and opposite them, linear-spatulate, nectary-like, reflexed. Fruit a capsule. Seeds many. (Honor of G. Vancouver, a Pacific explorer.)

A. Leaves thin, membranous, withering soon after fruit matures; leaf-margin flat or nearly so, not white-margined. W. C.

V. hexandra M. & D.

AA. Leaves thick, somewhat coriaceous, persistent; leaf-margin slightly crisped, narrowly white-margined. U. *V. chrysantha* Gr.

BERBERIS

BARBERRY

Shrubs; wood yellow. Leaves simple or compound (ours), often spiny. Flowers yellow, in bracted racemes (ours). Sepals 6—9, petal-like. Petals 6, imbricated in 2 whorls, each with 2 basal glands. Stamens 6, closing around the stigma when touched; anthers opening by valves at the top. Pistil 1; stigma peltate. Fruit a berry. Seeds 1—few. (From Arabic *berberys*—the name for the fruit of these plants.)

A. Leaves with the 3 chief veins from the base. W. C. E.

B. nervosa Pursh (Dull Oregon Grape)

AA. Leaves with but 1 vein from the base.

B. Leaflets 3—7, pale-green, dull; leaf-teeth with weak spines. U. C. E. (*B. pumila*; *B. nana*.) *B. repens* Lindl. (Small Oregon Grape)

BB. Leaflets 5—11, bright green, shining; leaf-teeth with strong spines. W. C. E.

B. aquifolium Pursh (Shining Oregon Grape)

LAURACEAE

Laurel Family

Shrubs or trees, *aromatic*. Leaves alternate (ours) or opposite, mostly thick, evergreen (ours), shining (ours), petioled; stipules none. Flowers small, yellowish-green (ours), in panicles or racemes or umbels (ours). Perianth 4—6(ours)-parted, in 2 whorls. Stamens 9 (ours) or 12, in 3 (ours) or 4 whorls, *on the perianth*, distinct, often some of them reduced or modified. Ovary *superior*, 1-celled, 1-ovuled; style 0—1; stigma disk-like or head-like. Fruit a drupe (ours) or a berry.

UMBELLULARIA

LAUREL

Ours 3—20 m. high. Leaves in ours 5—10 cm. long, lanceolate-oblong, entire or sinuate, very aromatic. Flowers perfect, in axillary umbels but apparently in a terminal panicle (ours). Calyx in ours 3—6 mm. long. Drupes subglobose; in ours 2—2.5 cm. long, on short stout peduncles. (*L. umbella*—an umbel; referring to the flower arrangement.) U. *U. californica* Nutt. (California Laurel)

PAPAVERACEAE

Poppy Family

Herbs, rarely shrubby; *juice milky or colored* at least in the root. Leaves alternate or opposite or whorled; *stipules none*. Peduncles 1-flowered. *Flowers regular*. *Sepals* 2—3. *Petals* 4—12, in 2 sets, imbricated in the bud. *Stamens indefinite in number*. Ovary *superior*. *Fruit a capsule*, 1-celled; placentae parietal. Seeds many.

A. Most of the leaves opposite or whorled, entire.

B. Stamens 4 or 6; filaments narrow; carpels 3—4; flowers white or yellow.

PLATYSTIGMA (p. 174)

BB. Stamens 6; filaments very wide; carpels 6—18; flowers yellow.

PLATYSTEMON (p. 174)

AA. Leaves alternate.

C. Leaves lobed or dissected.

D. Flowers bright yellow; ovary and capsule with 2 placentae; stigma composed of 4—6 lobes. ESCHSCHOLTZIA (p. 174)

DD. Flowers red; ovary and capsule with many placentae; stigma a radiate disk.

PAPAYER (p. 174)

CC. Leaves entire; flowers yellow; ovary and capsule with 3 placentae; stigmas 3.

CANBYA (p. 175)

PLATYSTIGMA

CREAM-CUPS

Annual, low, slender. Leaves opposite or whorled, entire. Flowers white or yellow, on long peduncles. Sepals 2—3, distinct. Petals 4 or 6, deciduous. Stamens 6—12, rarely 4; filaments narrow. Carpels 3, rarely 4, wholly united into a 3-angled to nearly terete ovary. Seed smooth, shining. (Gk. platys=flat, + stigma; some species have wide flat stigmas.)

A. Plant glabrous; stem leafy; leaves 4—23 mm. long, the lower round to spatulate; petals white, 2—4 mm. long; stamens 4—6. W. C.

P. oreganum B. & H. (White Cream-cups)

AA. Plant somewhat villous; stem somewhat scape-like; leaves 25—50 mm. long, all linear; petals yellow, 8—12 mm. long; stamens many. U.

P. lineare Benth. (Yellow Cream-Cups)

PLATYSTEMON

CREAM-CUPS

Annual, low. Leaves mostly opposite or whorled, entire. Flowers yellow, on long peduncles, nodding when in bud. Sepals 3, distinct. Petals 6. Stamens many; filaments wide, flat. Carpels 6—18, at first all united in a circle into a deeply many-sulcate compound ovary by as many placentae, in fruit separating and closing into as many tortulose narrow follicles. Mature follicles inclined to break open transversely into a few 1-seeded joints. (Gk. platys=flat, stemon=a stamen; the stamens have flat filaments.) U.

P. californica Benth. (Long-leaved Cream-cups)

ESCHSCHOLTZIA

CALIFORNIA POPPY

Herbs, glabrous; juice bitter, of the stem colorless, of the root red or yellow. Leaves alternate, finely dissected. Flowers bright yellow. Sepals 2, completely united into a conical cap, detached and pushed off by the growth of the petals. Petals 4. Stamens many; filaments short. Ovary linear; placentae 2; style very short; stigma divided into 4—6 lobes; lobes linear, unequal, divergent. Capsule elongated, strongly 10-veined, opening usually from the bottom for the whole length by 2 valves. Seeds many. (Honor of J. F. Eschscholtz, a German botanist.)

A. Leaves ternately 1—3-compound; flowers 2.5—10 cm. wide; dilated receptacle with expanded rim which is 0.5—6 mm. wide.

B. Flowers 5—10 cm. wide; escaped from cultivation. W. E.

E. californica Cham.

BB. Flowers 2.5—5 cm. wide; native. W. E. (*E. columbiana*.)

E. douglasii Benth.

AA. Leaves pinnate, 5-foliolate; flowers 1—2.5 cm. wide; dilated receptacle without expanded rim. U.

E. hypecoides Benth.

PAPAVER

POPPY

Herbs, hispid or glaucous; sap milky, narcotic. Leaves alternate, lobed or dissected. Flowers nodding when in bud, showy. Sepals 2—3. Petals 4—6. Stamens many. Placentae numerous, projecting inward; stigmas united into a radiate persistent disk. Capsule globose or obovoid or oblong, opening near the tip. Seeds many. (Said to be from Celtic papa=pap; because poppy juice was formerly put into children's food to make them sleep.)

A. Leaves pinnately parted; herbage hairy, not glaucous.

B. Capsule club-shaped, stiff-hairy; native. E.

P. argemone L. (Club Poppy)

- BB. Capsule subglobose or top-shaped, glabrous; escaped from gardens. W.
P. rhoeas L. (Field Poppy)
 AA. Leaves merely lobed; herbage glabrate, glaucous; escaped from gardens. W.
P. somniferum L. (Garden Poppy)

CANBYA

- Herbs, annual. Leaves alternate, entire. Scapes numerous, filiform, 1-flowered.
 Sepals 3. Petals 6, scarious, bright yellow (ours). Stamens 6—9; filaments longer
 than the oblong-linear anthers. Style none; stigmas 3, oblong-linear. Capsule ovoid,
 1-celled, 3—6-valved from above. (Honor of W. M. Canby, an American botanist.)
 E.
C. aurea Wats.

FUMARIACEAE

Bleeding-heart Family

Herbs, tender; *juice watery*. Leaves compound, dissected, alternate. *Flowers* perfect, *irregular*. *Sepals* 2, small, hyaline. *Petals* 4, 1—2 of them spurred, somewhat united. *Stamens* 6, *diadelphous*, opposite the outer petals. Ovary superior. Capsule 1-celled; placentae 2, parietal.

- A. 2 outer (larger) petals alike, both spurred or sac-like at base. DICENTRA (p. 175)
 AA. 2 outer (larger) petals unlike, only 1 spurred at base. CORYDALIS (p. 175)

DICENTRA (Bikukulla, Biuculla) BLEEDING HEART

Perennial, erect or diffuse or climbing, acaulescent. Leaves dissected. Flowers in scapose racemes; pedicels 2-bracted. Corolla cordate at base; petals in 2 pairs; the outer pair oblong, concave, spurred or saccate at base, spreading at apex; the inner pair narrow, clawed, united above, crested or winged on the back. Style slender; stigma 2—4-lobed. Capsule oblong or linear, opening by 2 valves. (Gk. dis=twice, kentron=a spur; from the 2-spurred corolla.)

- A. Flowers in a raceme or panicle, white or pinkish.
 B. Corolla 2-spurred at base, white or pinkish.
 C. Spurs divergent; corolla 12—16 mm. long, white or pinkish. E.
D. cucullaria DC. (Dutchman's Breeches)
 CC. Spurs not divergent; corolla 18—25 mm. long, white. U.
D. pauciflora Wats. (White Bleeding-heart)
 BB. Corolla 2-saccate at base, pink. C. E.
D. uniflora Kell. (1-flowered Bleeding-heart)
 AA. Flowers in a thyrus, pink. W. C. E.
D. formosa DC.

CORYDALIS (Capnoides, Capnodes) CORYDALIS

Erect or climbing. Leaves basal or cauline. Flowers in racemes, terminal or opposite the leaves. One petal of the outer pair spurred; inner petals narrow, keeled on the back. Styles erect, dilated or lobed or persistent. Capsule linear or oblong, 2-valved. (Gk. korydalos=the crested lark; said to be suggested by the spurs.)

- A. Flowers pink or white, or light-yellow with bluish tips; perennial; capsule oval or oblong.
 B. Leaves many-pinnatifid; flowers pink. W.
C. scouleri Hook. (Pink Corydalis)
 BB. Leaves 2—3-pinnatifid; flowers salmon-pink or yellow.
 C. Leaves 3-pinnatifid; flowers salmon-pink; sepals hastate. E.
C. hastatum Rydb.

- CC. Leaves 2-pinnatifid; flowers yellow; sepals laciniate-reniform. E.
C. cusickii Wats.
 AA. Flowers golden-yellow; annual or biennial; capsule linear or nearly so.
 D. Capsule incurved-ascending; seed acute-margined. E. (*C. aurea occidentalis*).
C. montana Engelm.
 DD. Capsule spreading or pendulous; seed obtuse-margined. E.
C. aurea Willd. (Golden Corydalis)

CRUCIFERACEAE (Brassicaceae) Mustard Family

Herbs, rarely shrubby at base, annual or biennial or perennial, *with mustard or turnip taste*. Leaves alternate, pinnately or palmately (*Dentaria*) veined. Flowers perfect, solitary or in racemes or corymbs or head-like clusters. *Sepals* 4, deciduous. *Petals* 4, rarely none, alternate with the sepals. *Stamens* 6, *tetradynamous*, rarely only 2 or 4. *Ovary* 2-celled by a partition from one lateral placenta to the other, rarely only 1-celled; style 0—1; stigma entire or 2-lobed. Fruit a pod, often much elongated, indehiscent or opening by 2 valves from the base; partition left when valves open.

- A. Leaves palmately-compound or -lobed or -toothed. GROUP 1, L (p. 176)
 AA. Leaves not palmately veined, or if so merely serrate.
 B. Basal leaves 2—4.5 dm. long, not pinnately compound nor pinnatifid. GROUP 1, K (p. 176)
 BB. Basal leaves smaller, often pinnately compound or pinnatifid. GROUP 2, K (p. 178)
 C. Flowers solitary on a scape. GROUP 2, K (p. 178)
 CC. Flowers in racemes or heads.
 D. Pod transversely divided into 2 terete or slightly flattened or angular segments or joints, indehiscent, upper joint the larger; plant glabrous; leaves entire or sinuate-toothed. GROUP 1, Y p. 176)
 DD. Pod or plant or leaves not as in D.
 E. Leaves awl-shaped; plants aquatic. GROUP 2, P (p. 178)
 EE. Leaves not awl-shaped; plants mostly terrestrial.
 F. Pod 3 or more times as long as wide including its stipe and beak. GROUP 1 (p. 176)
 FF. Pod less than 3 times as long as wide including its stipe and beak. GROUP 2 (p. 178)

GROUP 1 (with long pods)

- A. Petals yellow.
 B. Leaves entire or merely serrate.
 C. Seeds in 2 rows in each cell of the pod; mature pod 3—14 mm. long. DRABA (p. 187)
 CC. Seeds in 1 row in each cell of the pod; mature pod 1.5—10 cm. long (or as short as 1 cm. in *Erysimum cheiranthoides*).
 D. Pod torulose; valves veinless or faintly 1-veined; petals 4—6 mm. long. SCHOENOCRAMBE (p. 183)
 DD. Pod not torulose; valves strongly keeled by the prominent mid-vein; petals 6—25 mm. long (except *E. cheiranthoides*). ERYSIMUM (p. 190)
 BB. At least some of the leaves lobed or pinnatifid or pinnately compound.
 E. Most of the leaves of the upper $\frac{1}{2}$ of the stem entire or merely serrate.
 F. Pod not beaked, 5—12.5 cm. long when mature. (See DD.)
 FF. Pod beaked, 2 cm. or less long when mature. (See HH.)
 EE. Most of the leaves of the upper $\frac{1}{2}$ of the stem lobed or pinnatifid or pinnately compound.
 G. Pod indehiscent; seeds 2—10. RAPHANUS (p. 184)

- GG. Pod dehiscent; seeds usually more numerous.
- H. Pod beakless or the beak very short and thick.
- I. Seeds flat, in 2 rows in each cell; leaves lyrate-pinnatifid.
BARBAREA (p. 184)
- II. Seeds not flat, in 1 or 2 rows in each cell; leaves not or hardly lyrate-pinnatifid.
- J. Pod either 3.5 cm. or more long, or else almost sessile and quite rigidly erect-appressed.
SISYMBRIUM (p. 183)
- JJ. Pod less than 2.5 cm. long, distinctly pediceled, not rigidly erect-appressed.
- K. Pubescence of forked hairs.
RORIPA (p. 184)
- KK. Pubescence of simple hairs or none.
SISYMBRIUM (p. 183)
- HH. Pod with an abruptly slender or a flat beak at least $\frac{1}{8}$ as long as the fertile portion.
BRASSICA (p. 183)
- AA. Petals either none or of some color other than yellow.
- L. Leaves ternately- or palmately-lobed or -lacinate or -divided.
DENTARIA (p. 186)
- LL. Leaves pinnately-toothed to -compound, or entire and pinnately-veined.
- M. Pod borne on a stipe 1 cm. or more long.
STANLEYA (p. 179)
- MM. Pod without a stipe or with a very short one.
- N. Some of the leaves pinnatifid.
- O. Stem-leaves all pinnatifid.
- P. Pod indehiscent, not longitudinally 2-celled.
RAPHANUS (p. 184)
- PP. Pod dehiscent, longitudinally 2-celled.
- Q. Pod terete, 1—16 mm. long; plants of ditches. (See K.)
- QQ. Pod flattened parallel to the partition, 12—31 mm. long; mostly not ditch plants.
CARDAMINE (p. 185)
- QQQ. Pod flattened at right angles to the partition, 6—10 mm. long; plants of rather dry places.
SMELOWSKIA (p. 189)
- OC. At least the leaves of the upper half of the stem entire or merely toothed or serrate.
- R. Pod 3 cm. or less long.
ARABIS (p. 189)
- RR. Pod 3.5 cm. or more long.
- S. Petals undulate-crisped, but little longer than the sepals, the blade merely a wide extension of the claw.
CAULANTHUS (p. 180)
- SS. Petals plane, much longer than the sepals or else the blade well developed.
THELYPODIUM (p. 179)
- NN. All of the leaves from entire to shallowly lobed, none pinnatifid.
- T. Mature pod 2.5 cm. or less long.
- U. Pod flattened parallel to the partition.
- V. Leaves all petioled; valves veinless. (See QQ.)
- VV. Stem-leaves sessile.
- W. Valves of the pod veinless; stem-leaves not clasping.
DRABA (p. 187)
- WW. Valves 1-veined; stem-leaves clasping in most species.
ARABIS (p. 189)
- UU. Pod terete or angular or hardly flattened.
- X. Plant glabrous.
- Y. Pod 2-celled by a transverse constriction, indehiscent.
CAKILE (p. 183)
- YY. Pod 2-celled by a longitudinal wall, dehiscent.
THELYPODIUM (p. 179)

- XX. Plant more or less pubescent with branched hairs.
 - Z. Flowers in a globular head. BRAYA (p. 191)
 - ZZ. Flowers in an elongated raceme. STENOPHRAGMA (p. 192)
- TT. Mature pod more than 2.5 cm. long.
 - a. Pod strongly flattened parallel to the partition.
 - b. Valves of the pod veinless. STREPTANTHUS (p. 180)
 - bb. Valves 1-veined.
 - c. Seed winged; leaves only rarely densely tomentose on both sides. ARABIS (p. 189)
 - cc. Seed not winged; leaves densely tomentose on both sides with fine stellate pubescence. PARRYA (p. 191)
 - aa. Pod terete or angular or only very slightly flattened. (See WW.)

GROUP 2 (with short pods)

- A. Flowers yellow.
 - B. Pod flattened parallel to the partition.
 - C. Pod orbicular; seeds 2 in each cell of the pod. ALYSSUM (p. 191)
 - CC. Pod elliptic to oblong; seeds 3 or more in each cell. DRABA (p. 187)
 - BB. Pod flattened at right angles to the partition.
 - D. Leaves spatulate; cells of the pod much inflated and appearing like twin pods. PHYSARIA (p. 186)
 - DD. Leaves sagittate-clasping; cells of the pod not inflated; pod obovoid. CAMELINA (p. 187)
 - BBB. Pods terete.
 - E. Pod indehiscent, globose, 1-celled, 1—2-seeded. NESLIA (p. 187)
 - EE. Pod dehiscent, oval to cylindric, 2-celled, several- to many-seeded.
 - F. Pod oval or obovate; leaves entire to wavy. LESQUERELLA (p. 186)
 - FF. Pod oblong; in nearly all species some of the leaves pinnatifid. RORIPA (p. 184)
 - AA. Flowers not yellow, petals often none.
 - G. Pod indehiscent, orbicular, flattened, 1-celled, 1-seeded.
 - H. Pubescence branched; pod not wing-margined. ATHYSANUS (p. 188)
 - HH. Pubescence simple; pod wing-margined. THYSANOCARPUS (p. 188)
 - GG. Pod dehiscent, various in form, often flattened, 2-celled, more than 1-seeded.
 - I. Pod terete. COCHLEARIA (p. 182)
 - II. Pod flattened parallel to the partition.
 - J. Seeds 4 or more in each cell of the pod.
 - K. Flowers solitary, on scapose stems; seed broadly winged. PLATYSPERMUM (p. 186)
 - KK. Flowers in racemes, often on scapose stems; seed wingless. DRABA (p. 187)
 - JJ. Seed 1 in each cell of the pod. LOBULARIA (p. 191)
 - III. Pod flattened at right angles to the partition.
 - L. Pod lanceolate or oblong-lanceolate. SMELOWSKIA (p. 189)
 - LL. Pod shorter for its width.
 - M. Valves of the pod obtusely keeled or rounded on the back.
 - N. Pod warty-wrinkled or -tubercled, 2-seeded. CORONOPUS (p. 182)
 - NN. Pod not as above, many-seeded.
 - O. Pod obcordate or triangular-obovate, much flattened, notched at apex. CAPSELLA (p. 187)
 - OO. Pod ovate or elliptic, not much flattened, not notched at apex.
 - P. Leaves entire, awl-shaped; aquatic; seeds few. SUBULARIA (p. 181)

PP. Leaves pinnatifid, not awl-shaped; terrestrial; seeds many.

HUTCHINSIA (p. 187)

MM. Valves of the pod acute- or wing-keeled.

Q. Pod orbicular or obovate; cells 1—2-seeded; petals often none.

LEPIDIUM (p. 181)

QQ. Pod ovate or oblong; cells 2- to several-seeded; petals always present.

THLASPI (p. 182)

STANLEYA

Biennial or perennial, stout. Leaves entire or few-toothed. Flowers white or greenish or yellow (not ours), in elongated many-flowered racemes. Sepals long, spreading. Petals long, narrow, slender-clawed. Stigma sessile, entire. Pod terete or subterete, elongated, on a slender stipe; valves 1-veined. Seeds oblong, in 1 row in each cell. (Honor of E. Stanley, ex-president of the Linnaean Society.)

A. Flowers white or greenish.

B. Stem angular; buds as much as 15 mm. long and scattered before opening; pedicels in fruit 6—8 mm. long. E.

S. viridiflora Nutt.

BB. Stem terete; buds 8—10 mm. long and densely massed before opening; pedicels in fruit 12—15 mm. long. E.

S. confertiflora How.

AA. Flowers yellow. E. *rara* Nels.

THELYPODIUM

PURPLE MUSTARD

Annual or biennial, mostly coarse. Leaves entire or pinnatifid. Flowers white or purple or rarely yellow (not in ours), in long racemes. Sepals equal or the lateral pair saccate at base. Petals plane. Stamens well exerted. Stigma usually small. Pod slender, elongated, terete or 4-angled, often torulose, with short thick stipe. Seeds in 1 row, somewhat flat. (Gk. *thelys*=female, *poys*=foot or stalk; the pod is short-stalked.)

A. Stem-leaves cordate-clasping or auriculate at base, sessile.

B. Pods 1.2—3.1 cm. long; petals 4—12 mm. long.

C. Flowers in young clusters opening considerably below the bud-bearing apex of the flowering axis.

D. Plant hispid near the base; stem-leaves 2.5 cm. or less long; buds and flowers ascending. E.

T. howellii Wats.

DD. Plant glabrous thruout; stem-leaves 2.5—7.5 cm. long; buds and flowers widely spreading. E.

T. eucosmum Rob.

CC. Flowers opening close to the summit of the cluster while it is still corymbose.

E. Basal leaves spatulate; stem-leaves oblong-lanceolate to ovate-lanceolate, their auricles obtuse. E.

T. torulosum Hel.

EE. Basal leaves lanceolate; stem-leaves linear-oblong to linear-lanceolate, their auricles acute. E. *T. flexuosum* Rob.

BB. Pods 5—7.5 cm. long; petals 14—17 mm. long. E. (*T. nuttallii*.)

T. sagittatum Hel.

AA. Stem-leaves not cordate-clasping nor auriculate at base, either sessile by a narrow base or distinctly petioled.

F. Annual; racemes loose; pods reflexed. W. E.

T. lasiophyllum Gr.

FF. Biennial; racemes dense; pods spreading.

G. Leaf-margin entire or wavy; pods about 2.5 cm. long. E.

T. integrifolia Endl.

GG. At least some of the leaves with margin serrate or more deeply lobed.

H. Leaves coarsely dentate to entire; pods mostly erect or ascending, 6—10 cm. long; pedicels and rachis milky-white. E.

T. milleflorum Nels.

HH. Leaves lacinate to dentate; pods spreading, 3.7—7.5 cm. long; pedicels and rachis green. C. E. (*T. leptosepalum*.)

T. laciniatum Endl.

CAULANTHUS

WILD CABBAGE

Biennial or perennial, stout. Leaves mostly pinnatifid. Flowers dull-colored, in long loose racemes. Sepals large, nearly equally saccate at base. Petals but little longer than the sepals, undulate-cripsed; claw long; blade small. Stigma emarginate to 2-lobed. Pod sessile, with short thick stipe, terete, elongated; valves 1-veined. Seeds in 1 row in each cell, oblong, flat, emarginate or scarcely margined. (Gk. *kaulos*=stem, *anthos*=flower; referring to the long claws of the petals.)

A. Stem somewhat hairy; flowers ascending. E.

C. pilosus Wats.

AA. Stem glabrous.

B. Flowers erect or ascending. Sepals 10—12 mm. long. E.

C. crassicaulis Wats.

BB. Flowers horizontal or reflexed; sepals less than 10 mm. long. E.

C. hastatus Wats.

STREPTANTHUS

TWIST-FLOWER

Branching. Leaves entire to pinnatifid. Flowers white or purple or yellowish (not ours). Sepals usually colored, equal at base or rarely 1 or more of them saccate. Petals more or less twisted or undulate, channeled. Longest pair of stamens often united below. Stigma entire. Pod sessile, oblong to narrowly linear, compressed or subterete; valves 1-veined. Seed flat, margined or winged. (Gk. *streptos*=twisted, *anthos*=flower; referring to the twisted petals.)

A. Stem-leaves clasping, auriculate or sagittate or cordate.

B. Stem simple; pods 5—10 cm. long, spreading. E.

S. cordatus Nutt.

BB. Stem branched; pods 2.5—6.8 cm. long, erect or ascending or arcuate.

C. Plant somewhat hairy below, not glaucous; stem-leaves ovate to lanceolate, the upper acuminate; sepals acuminate. U.

S. glandulosus Hook.

CC. Plant glabrous and glaucous; stem-leaves obovate-spatulate to orbicular, the upper obtuse; sepals acute. U.

S. orbiculatus Gr.

AA. Stem-leaves not clasping nor auriculate nor cordate.

D. Annual; stem branching from the base; sepals 4 mm. or less long; pod 2.5—5 cm. long, 2 mm. wide, pendulous. E.

S. longirostris Wats.

DD. Perennial; stem simple; sepals 6 mm. or more long; pod 5—7.5 cm. long, 3—4 mm. wide, erect or spreading. U.

S. howellii Wats.

SUBULARIA

AWL-WORT

Annual, small, aquatic, submerged; stem scapose. Leaves linear, subulate. Flowers minute, white, distant, in a terminal raceme. Stigma sessile, entire. Pod oblong or elliptic, short-stiped; valves convex, ribbed on the back. Seeds few, in 2 rows in each cell, marginless. (*L. subula*=an awl; from the leaves.) W. E.

S. aquatica L. (Water Awl-wort)

LEPIDIUM

PEPPER-GRASS

Leaves small, pinnatifid or merely dentate. Flowers white (ours) or yellow, small, in terminal racemes. Sepals short, obtuse, equal at base. Petals entire, rounded at apex, sometimes none. Stamens 2—6, free. Style 0—1. Pod orbicular or ovate, emarginate to deeply notched at the apex, strongly flattened at right angles to the partition; valves acutely keeled; cells 1—2-seeded. Seed not winged. (Gk. *lepidion*=a little scale; from the form of the fruit.)

A. Stem-leaves with a sagittate-clasping base. U.

L. campestre R. Br. (Cow-cress)

AA. Stem-leaves narrowed into a petiole at base or at least not clasping.

B. Capsule 2-toothed at apex.

C. Plant glabrous or nearly so; petals none. W.

L. oxycarpum T. & G.

CC. Plant hispidulous or pubescent.

D. Leaves linear, usually entire, tapering at both ends; petals usually none. E.

(*L. acutidens*.) *L. dictyotum* Gray

DD. Leaves pinnatifid; petals none. W. (*L. reticulatum*; *L. oreganum*.)

L. strictum Ratt.

BB. Capsule obcordate to merely retuse at apex, not 2-toothed.

E. Styles present but sometimes short, persistent.

F. Leaves entire. E. *L. integrifolium* Nutt.

FF. Leaves pinnatifid.

G. Plant glabrous; pod wing-margined all around. W.

L. sativum L. (Garden-cress)

GG. Plant minutely pubescent or puberulent; pod wing-margined only above.

E. (*L. idahocense*; *A. simile*.)

L. montanum Nutt.

EE. Style none.

H. Pod 4—5 mm. long, shining. E.

L. nitidum Nutt. (Tongue Grass)

HH. Pod 2—3 mm. long, not shining.

I. Petals none or not exceeding the sepals.

J. Leaf-segments usually acute; pod glabrous.

K. Annual; petals none; plant branching above. E.

L. apetalum Willd.

KK. Biennial; petals about as long as the sepals; plant branching from near base. E.

L. ramosum Nels.

JJ. Plant branching from near the base; leaf-segments usually obtuse; pod somewhat hairy. E.

L. lasiocarpum Nutt.

II. Petals present, equaling or exceeding the sepals.

- L. Basal leaves pinnately parted, pubescent. W. (*L. occidentale*)
L. menziesii DC.
 LL. Basal leaves dentate, glabrous. W. E.
L. medium Gr. (Tall Pepper-grass)

CORONOPUS

WART-CRESS

Annual or biennial, diffuse. Leaves mostly pinnatifid. Flowers small, whitish. Stamens 2—6, free. Stigma sessile. Pod small, flattened at right angles to the partition, sessile; valves oblong or subglobose, obtuse at each end, indehiscent but falling away from the partition at maturity, wrinkled or tubercled. Seed 1 in each cell. (Gk. korone=crow, pous=foot; referring to the deeply cleft leaves.)

A. Pod notched at apex, rough-wrinkled. W.

C. didymus Sm.

AA. Pod not notched at apex, tubercled. W. (*C. ruellii*.)

C. procumbens Gili.

THLASPI

PENNY-CRESS

Annual or perennial, glabrous, low, erect. Leaves entire or dentate; at least the upper stem-leaves auriculate and clasping. Flowers white or purplish. Sepals obtuse. Petals obovate or oblanceolate, entire. Stamens free, unappendaged. Style 0—1; stigma small, entire or slightly emarginate. Pod cuneate or obcordate or oblong-orbicular, mostly emarginate, flattened at right angles to the partition, crested or winged, dehiscent. Seeds 2—several in each cell, wingless. (Gk. thlaein—to crush; on account of the flat pod.)

A. Pod 8—12 mm. wide, broadly wing-margined, notched $\frac{1}{4}$ — $\frac{2}{5}$ its length; annual. W. E.

T. arvense L. (Field Penny-cress)

AA. Pod 2—5 mm. wide, hardly wing-margined or notched; perennial.

B. Leaves green, not glaucous. C. E.

T. alpestre L. (Perennial Penny-cress)

BB. Leaves glaucous. E. (*T. glaucum*.)

T. alpestre glaucum Nels.

COCHLEARIA

SPOON-CRESS

Glabrous, low, somewhat succulent. Leaves mostly entire. Flowers small, white. Sepals rounded at apex. Petals obovate or cuneate. Stamens free. Stigma simple or nearly so; style 1 to almost none. Pod subglobose to short-oblong, often somewhat flat at right angles to the partition, very turgid; valves 1-veined. Seeds 2—several, in 2 rows in each cell. (L. cochlear=a spoon; the leaves are somewhat spoon-shaped.) W.

C. anglica L.

STENOPHRAGMA

Annual (ours) or perennial, low, erect, pubescent with forked hairs. Leaves chiefly basal, entire or serrate; stem-leaves few or reduced, sessile by a narrow base. Flowers small, white, in racemes. Style short; stigma 2-lobed. Pod slender, 4-angled or cylindric; pedicel slender; partition with very wide and obscure mid-vein. Seeds in 1 (ours) or 2 rows in each cell. (Gk. stenos=narrow, phragma=a partition; referring to the partition in the pod.) W. (*Sisymbrium thalianum*.)

S. thaliana Celak. (Mouse-ear Cress)

SISYMBRIUM (Sophia)

TANSY MUSTARD

Annual or biennial, mostly tall and erect; pubescence branched or simple. Leaves lobed or pinnatifid (ours). Flowers yellow (ours) or white or rarely pink. Petals usually elongated. Stamens free. Stigma simple or 2-lobed. Pod elongated, linear, terete or flat; valves mostly 3-veined. Seeds many, in 1 or 2 rows in each cell, marginless. (The Greek name of some plant of this family.)

A. Pubescence none or of simple hairs; stigma 2-lobed; pod firm.

B. Pod appressed, awl-shaped, 1—1.5 cm. long. W. E. (*Erysimum officinale*.)

S. officinale Scop. (Hedge Mustard)

BB. Pod spreading, linear, 5—10 cm. long. W. E.

S. altissimum L. (Tumbling Mustard)

AA. Pubescence of stellate or occasional forked hairs or reduced to minute granules; stigma entire; pod delicate.

C. Seeds in 2 rows in each cell of the pod. E. (*Sophia pinnata*.)

S. canescens Nutt. (Tansy Mustard)

CC. Seeds in 1 row in each cell of the pod.

D. Leaves 1—2-pinnatifid, subglabrous; pod 0.6—1.5 cm. long.

E. Pods 10—14 mm. long, spreading.

F. Pedicels 4—6 mm. long, shorter than the pods. E. (*S. incisa*.)

S. incisum Engelm. (Western Tansy Mustard)

FF. Pedicels 10—20 mm. long, longer than the pods. W. E. (*S. longipedicellata*; *S. filipes*.)

S. incisum filipes Gray

EE. Pods 3—6 mm. long, on ascending pedicels. W. E. (*S. hartwegianum*.)

S. incanum hartwegianum Wats. (Hartweg Tansy-Mustard)

DD. Leaves 3-pinnate, canescent; pod about 2 cm. long. E.

S. sophia L. (Flix-weed)

SCHOENOCRAMBE

PLAINS MUSTARD

Perennial, glaucous, with horizontal branching rhizomes; whole plant often little leafy and of a reed-like appearance. Stem-leaves linear, entire or pinnate. Flowers yellow, in racemes. Petals twice as long as the sepals; claw long. Stigma entire. Pod slender, terete, somewhat torulose; valves veinless or faintly 1-veined. (*Crambe* is the genus of the Sea Kale, Gk. *schoenos*=a reed; nearly related to *Crambe*, and somewhat reed-like because the stem-leaves are few.)

A. Plant not glaucous; stem often branched, leafy. E.

S. linifolia Gr.

AA. Plant glaucous; stem always simple, nearly leafless above. E.

S. linifolia pinnata Nels.

CAKILE

SEA-ROCKET

Annual, glabrous, branching, fleshy, diffuse or ascending. Leaves in ours oblanceolate or obovate. Flowers purplish, in racemes. Petals long-clawed (ours), more than twice as long as the sepals (ours). Style none. Pod elongate, without stipe, indehiscent, slightly flat or terete or 4-ridged, 2-jointed; joints 1-celled, 1-seeded, the lower one not flattened. (Arabic name.) W. C. *edentula* Hook. (American Sea-rocket)

BRASSICA

MUSTARD

, Annual or biennial, coarse, erect. Basal leaves pinnatifid or lyrate; stem-leaves

dentate or nearly entire. Flowers large, yellow, in elongated racemes. Sepals equal or one pair saccate at base. Pod linear, sessile, terete or somewhat 4-sided, not stipitate; beak conical or flat; valves 1—3-veined. Seeds in 1 row, globose, not margined. (The Latin name of the cabbage.)

A. Stem-leaves auriculate and clasping at the base. W. E.

B. campestris L. (Turnip)

AA. Stem-leaves not auriculate nor clasping.

B. Pod-beak less than $\frac{1}{4}$ as long as the fertile part, terete; pod glabrous. W. E.

B. nigra Koch (Black Mustard)

BB. Pod-beak $\frac{2}{3}$ — $1\frac{1}{2}$ times as long as the fertile portion, flat or 2-edged.

C. Pod-beak somewhat 2 edged but not flat; pod glabrous. W. E.

B. arvensis Kuntze (Wild Mustard)

CC. Pod-beak flat; pod hairy. W.

B. alba Boiss. (White Mustard)

RAPHANUS

RADISH

Annual or biennial, coarse, branching. Leaves pinnatifid, lyrate. Flowers white or purple or yellow or pink, showy. Lateral sepals somewhat saccate. Petals large, clawed. Pod linear to lanceolate, attenuate upward to a distinct beak, indehiscent, transversely divided by several false partitions, coriaceous, fleshy or corky. Seed spherical or nearly so. (Gk. ra=quickly, phaino=to appear; referring to the rapid germination.)

A. Flowers white or yellow; dry pod grooved lengthwise; seeds 2—10. E.

R. raphanistrum L. (Wild Radish)

AA. Flowers white or pink or purple; dry pod not grooved lengthwise; seeds usually 2—3. W. E.

R. sativus L. (Garden Radish)

BARBAREA (Campe)

WINTER-CRESS

Biennial or perennial, glabrous, erect, branching; stems angled. Leaves entire or pinnatifid. Flowers yellow. Sepals often colored, the lateral pair often saccate at base and slightly united on the back near the apex. Petals spatulate or clawed. Stamens free. Style short; stigma 2-lobed. Pod linear, elongate, somewhat 4-angled. Seeds in 1 row in each cell. (Honor of St. Barbara, who used them medicinally.)

A. Pod ascending, 2.5—3 cm. long; flowers racemose even when opening. E. (*C. barbarea*; *B. americana*.) *B. vulgaris* R. Br. (Winter Cress)

AA. Pod appressed, 1—1.5 cm. long; flowers corymbosely aggregated when opening. W. *B. stricta* Anderz.

RORIPA (Nasturtium, Radicula)

CRESS

Annual or biennial or perennial, branching. Leaves simple to pinnately compound, rarely entire. Flowers white or yellow. Sepals greenish-yellow. Petals short-clawed. Stamens 1—6. Stigma 2-lobed or nearly entire. Pod short or elongate, terete or nearly so, not stipitate; valves usually 1-veined, sometimes veinless. Seeds minute, turgid, wingless, in 1—2 rows in each cell. (Said to be from Celtic ros=dew, ripa=a bank; referring to the habitat of some species.)

A. Flowers white; leaves either pinnately divided or else very large.

B. Leaves all pinnate; basal leaves 7.5—15 cm. long; pod linear; roots with mild radish taste. W. E. (*Nasturtium officinale*.)

R. nasturtium Rus. (Water-cress)

- BB. Rarely some of the lower leaves pinnate; basal leaves 45 cm. or less long; pod globular; roots with extremely strong radish taste. W.
R. armorica A. S. H. (Horse-radish)
- AA. Flowers yellow; leaves various, mostly pinnate, not extremely large.
- C. Perennial by running rhizomes; stems diffuse. E. (*R. sinuata pubescens*; *R. calycina*; *R. columbiae*.) *R. sinuata* A. S. H. (Spreading Yellow-cress)
- CC. Annual or biennial, without rhizomes.
- D. Stems diffuse, branched from the base; pedicels 6—8 mm. long.
- E. Stem hispid; pod oval or globose or ovoid, 3—5 mm. long. E.
R. hispida Brit. (Hairy-cress)
- EE. Stem glabrous thruout or nearly so; pod globose to oblong, 2—12 mm. long. W. E. (*R. pacifica*; *R. terrestris*.)
R. palustris Bes. (Marsh-cress)
- DD. Stems erect, simple below; pedicels 2—4 mm. long.
- F. Pod curved; leaf-lobes acute. W. E. (*R. lyrata*; *R. polymorpha*.)
R. curvisiliqua Bes. (Arc-cress)
- FF. Pod straight or nearly so; leaf-lobes obtuse. E. (*R. sphaerocarpa*; *R. tenerrima*.)
R. obtusa Brit. (Blunt-cress)

CARDAMINE

BITTER-CRESS

Annual or perennial. Leaves entire or pinnately-lobed or -divided, or pinnately-compound. Flowers white or purple, in racemes or corymbs. Petals obovate or narrowly spatulate. Stamens 6 or rarely 4. Pod linear, flat, usually erect, not stipitate; valves veinless or faintly veined. Seeds in 1 row in each cell, flat, marginless. (Gk. *kardia* =heart, *damao*=to strengthen; from the cordial properties of some.)

- A. Leaves all simple.
- B. Leaves ovate to elliptic, entire; alpine. C.
C. bellidifolia L. (Alpine Bitter-cress)
- BB. Leaves cordate to reniform, sinuate to toothed; subalpine. C. E. (*C. lyallii*.)
C. cordifolia Gray (Mountain Bitter-cress)
- AA. Leaves or some of them pinnately compound.
- C. Basal leaves simple; stem-leaves 3—5-foliolate. W. C. E. (*C. callosicrenata*; *C. vallicola*.)
C. breweri Wats. (Brewer's Bitter-cress)
- CC. Basal leaves pinnately compound.
- D. Leaves all 3-foliolate, sometimes 5-foliolate; leaflets coarsely 3—5-toothed.
W. C. *C. angulata* Hook. (3-leaved Bitter-cress)
- DD. Leaves 3—13-foliolate, only the smaller leaves if any 3—5-foliolate; leaflets coarsely toothed in some species.
- E. Leaves 7—13-foliolate; leaflets of basal leaves orbicular. W. E. (*C. pratensis occidentalis*; *C. occidentalis*.)
C. pratensis L. (Cuckoo-flower)
- EE. Leaves 3—7-foliolate.
- F. Flowers 2—3 mm. wide; leaflets petiolulate, lateral ones oblong. W. C.
E. (*C. kamtschatica*.)
C. parviflora L. (Small Bitter-cress)
- FF. Flowers 4—8 mm. wide.
- G. Leaflets petiolulate, roundish; seeds 8—20. W. C.
C. oligosperma Nutt.
- GG. Leaflets of the stem-leaves tending to be decurrent along the leaf-axis, lateral ones oblong to oval; seeds 20—40. W. C. E.
C. pennsylvanica Muhl. (Pennsylvania Bitter-cress)

DENTARIA

TOOTH-WORT

Perennial; rhizome fleshy, horizontal, scaly or toothed; stems erect, mostly unbranched, leafless below. Leaves palmately lacinate or 3-divided, petioled. Flowers white or rose or purple, in corymbs or short racemes. Petals much longer than the sepals. Style slender. Pod linear, straight, flat, without stipe, dehiscent; valves veinless or faintly mid-veined. Seeds 1 row in each cell, oval, flat, thick, wingless. (L. dens=tooth; referring to the tooth-like projections of the rootstock.)

- A. Stem-leaves of 3 petiolulate leaflets; basal leaves entire or with 3 leaflets. U.
D. californica Nutt.
- AA. Stem-leaves either not completely divided into leaflets or these not petiolulate.
- B. Basal leaves round-cordate, crenate or sinuate; racemes few-flowered. W. C.
D. tenella Pursh (Delicate Tooth-wort)
- BB. Basal leaves parted or divided into 3—5 segments; racemes densely many flowered.
- C. Petals 10—12 mm. long. U. C. E. (*D. quercetorum*; *D. gemmata*.)
D. macrocarpa Nutt.
- CC. Petals 12—17 mm. long. U. E. (*D. pulcherrima*; *D. sinuata*.)
D. macrocarpa pulcherrima Rob.

PLATYSPERMUM

Annual, small, green into winter. Leaves simple or pinnatifid. Flowers solitary, on simple scapes, white, small. Petals obovate, entire or retuse. Stigma sessile, entire. Pod sessile, orbicular, strongly flattened; partition flat, veinless, hyaline. Seeds 4—6 in each cell, in 2 rows, reticulate, orbicular, broadly winged. (Gk. platys=wide, sperma=seed.)

- E. *P. scapigerum* Hook.

PHYSARIA

TWIN-POD

Perennial, low stellate-hairy; stem erect or ascending, usually quite simple. Leaves spatulate, mostly entire; basal-leaves tufted. Flowers yellow, in terminal racemes. Petals longer than the sepals. Style filiform. Pod membranous, stellate-pubescent; partition narrow; cells inflated, subglobose, several-seeded. Seed not margined. (Gk. physa=a bladder; the pod is inflated.)

- A. Mature pod much inflated, 1.2—1.7 cm. wide, its upper sinus acute. E.
P. didymocarpa Gray
- AA. Mature pod but little inflated, its upper sinus shallow and rounded.
- B. Pedicels 6 mm. long; pod 5—8 mm. wide, its partition ovate. E.
P. geyeri Gray
- BB. Pedicels 12 mm. or more long; pod 10—20 mm. wide, its partition narrowly linear. E.
P. oregana Wats.

LESQUERELLA

BLADDER-POD

Annual or perennial, low, mostly with stellate hairs. Leaves entire or repand-dentate. Flowers mostly yellow. Petals spatulate to oblong-obovate, entire. Stigma flat, capitate, entire or lobed. Pod more or less turgid, rounded or ovate or short-oblong, sessile or stipitate; valves veinless; partition hyaline, veined from apex to middle. Seeds several to many, rounded, flat, wingless or narrowly wing-margined. (Diminutive, honor of L. Lesquereux, an American bryologist.)

- A. Hairs stellate; pod obovate, its cells 2-ovuled. E.
L. douglasii Wats.

- AA. Hairs not stellate; pod oval, its cells 4-ovuled. E.
L. occidentalis Wats.

HUTCHINSIA

Annual. Leaves pinnatifid. Flowers small, white, in terminal racemes. Petals small. Stigma sessile. Pod ovate or elliptic, membranous, but little flattened at right angles to the partition, somewhat tumid; its margin slightly keeled, wingless. Seeds many in each cell, in 2 rows. (Honor of a Miss Hutchins, an Irish botanist.) W. E.
H. procumbens DC.

CAPSELLA (Bursa)

SHEPHERD'S PURSE

Annual, erect, pubescent with forked hairs. Basal leaves in a rosette, stem-leaves fewer. Flowers small, white, in terminal racemes. Style short. Pod cuneate or obcordate or triangular, flattened at right angles to the partition; valves boat-shaped, keeled. Seeds many in each cell, marginless. (Diminutive of *L. capsula*=a box; referring to the pod.) W. E.
C. bursa-pastoris Med.

CAMELINA

FALSE FLAX

Annual, erect. Leaves sagittate-clasping, entire to pinnatifid. Flowers pale yellow (ours) or white. Sepals somewhat colored, often villous. Petals spatulate or obovate, clawed. Style slender; stigma entire. Pod obovoid or pear-shaped; valves firm, 1-veined, strongly convex; partition thin, wide, obovoid, persistent. Seeds in 2 rows in each cell, many, wingless. (Gk. *chamai*=dwarf, *linon*=flax.)

- A. Pod 6—7 mm. wide; plant glabrous or nearly so. W. E.

C. sativa Crantz

- AA. Pod 4—5 mm. wide; plant pubescent at least below. E.

C. microcarpa Andr.

NESLIA

Annual, erect, branching, hispid with branched hairs. Leaves entire; the upper clasping by a sagittate base (ours), lanceolate or linear-lanceolate (ours). Flowers yellow, small, about 2 mm. wide (ours), in racemes. Style filiform. Pod small, globose, wingless, reticulated, indehiscent, 1-celled, 1—2-seeded. (Honor of J. A. N. De Nesle, a French botanist.) E.

N. paniculata Desv.

DRABA

WHITLOW-GRASS

Annual or perennial, low, tufted, mostly stellate-pubescent; stems scapose or leafy. Leaves simple, entire or toothed. Flowers white or yellow, chiefly in racemes. Stigma nearly entire. Pod elliptic or oblong or linear, flat, dehiscent; valves veinless. Seeds few to many, wingless, in 2 rows in each cell. (Gk. *drabe*=biting; referring to the sharp taste.)

- A. Flowers white.

- B. Pedicels reflexed. U. (*Heterodraba unilateralis*.)

D. unilateralis Jones (Twisted Whitlow-Grass)

- BB. Pedicels not reflexed.

- C. Petals deeply 2-cleft. W. E. (*Eriophila verna*.)

D. verna L. (Early Whitlow-grass)

- CC. Petals entire or merely emarginate.

- D. Annual, herbaceous thruout, leafy stemmed.

- E. Flowers distant in the raceme; pod 2—4 mm. long. W.
D. brachycarpa Nutt. (Short-pod Whitlow-grass)
- EE. Flowers close in the raceme; pod 8—12 mm. long.
- F. Pod glabrous. E.
D. caroliniana Walt. (Carolina Whitlow-grass)
- FF. Pod short-hairy. E. (*D. micrantha*).
D. caroliniana micrantha Gray
- DD. Biennial or perennial, either woody at base or else scapose and caespitose.
- G. Leaves keeled by the prominent mid-vein.
- H. Leaves linear to oblong. E.
D. oligosperma Hook.
- HH. Leaves linear-spatulate to oblanceolate. E.
D. douglasii Gray
- GG. Leaves flat, not keeled by the prominent mid-vein. C. (*D. laevipes*).
D. lonchocarpa Rydb.
- AA. Flowers yellow.
- I. Annual; stems not woody, somewhat leafy.
- J. Leaf-blade widest at or above its middle; pedicels about equaling the pods; pod 8—15 mm. long. W. C. E.
D. stenoloba Ledeb.
- JJ. Leaf-blade widest below its middle; pedicels longer than the pods; pod 6—8 mm. long. W. E. (*D. nemorosa lutea*).
D. nemorosa L. (Wood Whitlow-grass)
- II. Perennial; stem either woody at base or else scapose from caespitose plants.
- K. Leaves flat, not keeled; plants with branching leafy-tufted caudex.
- L. Stems scapose above the caudex.
- M. Leaf-blade widest above its middle. (See N.)
- MM. Leaf-blade widest at or below its middle.
- N. Petals 6—8 mm. long; pod oblong, with slender beak. U.
D. howellii Wats.
- NN. Petals 3—4 mm. long; pod ovate-lanceolate, with thick beak. C. E.
D. lemmoni Wats.
- LL. Stems with few to many leaves above the caudex. C.
D. aureola Wats.
- KK. Leaves keeled by the prominent mid-vein; plants densely caespitose, scapose.
- O. Leaf-hairs mostly simple; scapes woolly-hairy; pod broadly ovate, about 4 times as long as the style. W. C. E. (*D. ventosa*).
D. densifolia Nutt. (Dense Whitlow-grass)
- OO. Leaf-hairs stellate; scapes glabrate or glabrous; pod ovate-oblong, 6—8 times as long as the style. E. (*D. glabella*; *D. glacialis*).
D. saximontana Nels. (Rock Whitlow-grass)

ATHYSANUS

Annual, slender. Leaves basal, usually toothed, oblanceolate (ours). Flowers small, white, in long racemes. Petals small or none. Style very short. Pod orbicular, less than 2 mm. long (ours), hairy with hooked hairs (ours), not margined, indehiscent, flat, veinless, 1-celled, 1-seeded. (Gk. a=without, thysanos=a fringe; because the pod is not wing-margined.) W. E. *A. pusillus* Gr.

THYSANOCARPUS

LACE-POD

Annual, slender, erect, sparingly branched. Basal leaves toothed or pinnatifid. Flowers minute, white or rose, in long racemes. Petals minute. Pod orbicular, wing-

margined, much flattened, plano-convex, indehiscent, 1-celled, 1-seeded. Seed somewhat flat, margined. (Gk. *thysanos*=a fringe, *karpos*=fruit or body; referring to the wing-margined pod.)

A. Upper leaves lanceolate or linear-lanceolate; pod 4—8 mm. wide, not radiately veined; pedicels 4—8 mm. long. E. (*T. curvipes madocarpus*.)

T. curvipes Hook. (Fringed Lace-pod)

AA. Upper leaves ovate-lanceolate or ovate-oblong; pod 8—10 mm. wide, radiately veined; pedicels 8—17 mm. long. U.

T. radians Benth. (Radiate Lace-pod)

SMELOWSKIA

Herbs but sometimes woody at base, perennial, low, caespitose; pubescence simple or stellate. Leaves 1—2-pinnatifid. Flowers small, white, in terminal racemes. Petals entire, obovate or spatulate, longer than the sepals. Stigma sessile. Pod lanceolate or lance-oblong, more or less flattened at right angles to the partition; valves sharply keeled. Seeds few. (Evidently named after some Russian.)

A. Capsule lanceolate, attenuate at each end; petals $1\frac{1}{2}$ times as long as the sepals. W. C. E. (*S. americana*.) *S. calycina* Mey.

AA. Capsule ovate, obtuse to subcordate at base, acute to attenuate at apex; petals $1\frac{1}{2}$ times as long as the sepals. W. C.

S. ovalis Jon.

AAA. Capsule linear, obtuse at base, acuminate at apex; petals 3 times as long as the sepals. U.

S. fremontii Wats.

ARABIS

ROCK-CRESS

Herbs but sometimes woody at base, annual or biennial or perennial, usually with stellate or forked pubescence. Leaves usually simple. Flowers white or purple, in bractless racemes. Sepals equal or the lateral ones saccate at base. Petals entire or emarginate, usually clawed. Stigma simple or barely 2-lobed. Pod linear, flattened parallel to the partition; valves flat or sub-convex, 1-veined; partition membranous. Seeds in 1—2 rows in each cell, elliptic or orbicular, more or less margined or winged. (Named from Arabia, the country where first found.)

A. At least the upper stem-leaves wholly glabrous; basal leaves somewhat pubescent.

B. Stem-leaves cordate or eared at base.

C. Mature pods erect or nearly so.

D. Flowers dark red to blackish; pod 7.5 cm. or more long. E.

A. atrorubens Gr. (Purple Rock-cress)

DD. Flowers white to pink.

E. Seeds in 1 row in each cell of the pod; flowers pinkish.

F. Pods 3—4 cm. long, nearly straight; sepals glabrous. W. C. E.

A. lyallii Wats.

FF. Pods 5—10 cm. long, curved; sepals pubescent. C. E. (*A. latifolium*).

A. lemmoni Wats.

EE. Seeds in 2 rows in each cell of the pod; pods 5—8 cm. long.

G. Stem hirsute at base; petals yellowish-white, hardly exceeding the sepals. W. C. E. (*A. perfoliata*.)

A. glabra Bernh. (Tower Mustard)

GG. Stem glabrate at base; petals pink or white, twice as long as the sepals. W. C. E.

A. drummondii Gray

- CC. Mature pods not erect.
 H. Mature pods not pendulous. E.
 A. microphylla Nutt.
 HH. Mature pods pendulous. U. C.
 A. suffrutescens Wats.
 BB. Stem-leaves not cordate nor eared at base.
 I. Petals pinkish; basal leaves oblanceolate, not lyrate-pinnatifid; seed broadly winged. W. *A. lyrata occidentalis* Wats. (Lyrate Rock-cress)
 II. Petals white; basal leaves lyrate-pinnatifid; seed wingless. U. C. (*A. howellii*.) *A. platysperma* Gray
 AA. Even the upper stem-leaves somewhat pubescent and the basal leaves also.
 J. Stem-leaves not cordate nor eared at base.
 K. Seed winged or wing-margined.
 L. Leaves all entire; seeds in 2 rows in each cell of the pod. W. C. E. (*A. purpurascens*; *A. suksdorfii*.)
 A. furcata Wats.
 LL. Lower leaves not entire; seeds in 1 row in each cell of the pod. E.
 A. cusickii Wats.
 KK. Seed wingless.
 M. Plant glabrous above, pubescent below with simple or forked hairs. E.
 A. nuttallii Rob.
 MM. Plant wholly stellate-pubescent. E.
 A. whitedii Pip.
 JJ. Stem-leaves cordate or eared at base.
 N. Pod strictly erect. W. C. E.
 A. hirsuta Scop. (Hairy Rock-cress)
 NN. Pod spreading or divaricate.
 O. Basal leaves entire or denticulate.
 P. Pods 1.2—3.7 cm. long. C.
 A. bolanderi Wats.
 PP. Pods 3.7—7.5 cm. long. U. E. (*A. kohleri*; apparently *A. arcoidea*.) *A. breweri* Wats.
 OO. Basal leaves dentate.
 Q. Stem-leaves branched, woody. E.
 A. perennans Wats.
 QQ. Stem-leaves simple, herbaceous or nearly so. C. E. (*A. secunda*; *A. arcuata*; *A. sparsiflora secunda*.)
 A. sparsiflora Nutt. (Sickle-pod)
 NNN. Pod reflexed or pendulous.
 R. Upper leaves coarsely toothed. U.
 A. subpinnatifida Wats.
 RR. Upper leaves entire.
 S. Basal leaves dentate. W. E. (*A. patula*; *A. retrofracta*; *A. columbiana*.) *A. hoelbellii* Horn.
 SS. Basal leaves entire. E. (*A. puberula*.)
 A. canescens T. & G.

ERYSIMUM (Cheiranthus)

WALL-FLOWER

Annual or biennial, mainly erect and branching, more or less pubescent or hoary. Leaves simple, entire or toothed or lobed. Flowers mostly yellow (so in ours). Stigma lobed. Pod elongate, linear, 4-angled or rarely terete; valves strongly keeled by a prominent mid-vein. Seeds in 1 row in each cell, oblong, marginless or narrowly margined at

the top. (Gk. *eryein*=to draw blisters; a property of the ground seeds of many of plants of this family.)

- A. Petals 4—5 mm. long; pod 1—2 cm. long. E. (*C. turretooides*.)
E. *cheiranthoides* L. (Treacle Mustard)
- AA. Petals 6—25 mm. long (unknown in *E. arenicola*); pod 2.5—10 cm. long.
- B. Pod terete or 4-angled.
- C. Petals 6—10 mm. long; pod 2.5—5 cm. long. E. (*C. inconspicuus*.)
E. *parviflorum* Nutt. (Small Wall-flower)
- CC. Petals 12—25 mm. long; pod 5—12.5 cm. long.
- D. Seed 4-angled. W. C. E. (*C. capitatus*.)
E. *asperum* DC.
- DD. Seed lens-shaped. C. E.
E. *elatum* Nutt.
- BB. Pod flattened parallel to the partition.
- E. Biennial; stems simple, not caespitose. W.
E. *arenicola* Wats.
- EE. Perennial; stems branched, caespitose. E.
E. *occidentale* Rob.

LOBULARIA

Herbs (ours) or shrubs, perennial, pubescent or canescent with forked hairs. Leaves entire. Flowers small, white, in terminal racemes. Petals obovate, entire. Filaments slender, not toothed, but with 2 small glands at the base. Pod compressed, oval or orbicular; cells 1-seeded. (L. *lobulus*=a little lobe; probably referring to the 2-lobed hairs.) W.

L. *maritima* Desv. (Sweet Alyssum)

ALYSSUM

Annual or perennial, low, branching, stellate-pubescent. Flowers small, yellow or yellowish, in racemes. Petals entire. Filaments often dilated and toothed or appendaged. Stigma nearly entire. Pod ovate, oblong to orbicular (ours), compressed; valves veinless; partition thin. Seeds 1—8 in each cell of the pod (2 in ours), wingless. (Gk. *a*=against, *lyssa*=madness; one was once reputed a remedy for hydrophobia.) W. E. (*Psilonema calycinum*.)

A. *alyssoides* Gouan (Yellow Alyssum)

BRAYA

Perennial, from a thickish root topped by a multicapital caudex. Leaves mostly basal, entire or merely dentate. Flowers in ours white or purplish, in a spherical head. Petals exserted, entire, short-clawed. Style short, persistent; stigma more or less distinctly 2-lobed. Pod oblong to linear-oblong (ours); valves convex or somewhat flat, not keeled, faintly 1-veined. Seeds in 2 rows in each cell. (Honor of F. G. DeBray, a French count.) C. (*Sisymbrium perplexum*.)

B. *humilis* Rob. (Low Rock-cress)

PARRYA

Perennial, low. Leaves mostly basal, somewhat fleshy, entire or toothed. Flowers rose or purple. Sepals equal or the lateral ones saccate at base. Petals spatulate, clawed. Style short; stigma 2-lobed. Pod compressed, 2.5—5 cm. long in ours; valves plane, 1-veined. Seeds in 1—2 rows in each cell, large, somewhat flat, orbicular. (Honor of W. E. Parry, an English explorer.) E. (*P. menziesii lanuginosa*.)

P. *menziesii* Gr.

CAPPARIDACEAE**Caper Family**

Herbs (ours) or shrubs or trees, annual (ours), often *with a radish or turnip taste*. Leaves alternate, simple (not ours) or ternately- or palmately-compound; stipules none. Flowers in ours perfect, regular or irregular, in racemes. Sepals 4—8. Petals 4 or rarely more. *Stamens* 4—32, somewhat unequal but *not tetradynamous*, on the receptacle. *Ovary* 1-celled; placentae 2, parietal; style 1. Fruit a pod, elliptic or linear, pedicelled (ours). Seeds kidney-shaped, many (ours).

A. Stamens 6; pods pendulous, long stiped, opening from the base upward.

CLEOME (p. 192)

AA. Stamens 12—19; pods erect, unstiped, opening from the tip downward.

POLANISIA (p. 192)

CLEOME

Erect, branched, glabrous or glandular-hairy. Leaves palmately 3—8-foliolate. Flowers white or purple or yellow. Sepals 4. Stamens 6. Pod linear to elliptic, stipitate, pendulous, opening from the base upward. (Gk. *kleio*=to close; referring to the flower.)

A. Leaflets 3; calyx 4-cleft; petals white to purplish. E.

C. serrulata Pursh (Stinking Clover)

AA. Leaflets 5 or on the upper leaves 3; calyx 4-cleft; petals yellow. E.

C. lutea Hook. (Stinking Mustard)

AAA. Leaflets 3; calyx of 4 distinct sepals; petals yellow. E.

C. platycarpa Torr.

POLANISIA (Jacksonia)**CLAMMY-WEED**

Glandular-pubescent (ours). Leaves 3(ours)—9-foliolate. Flowers white or rose or yellow (ours). Sepals 4. Petals 6—10 mm. long (ours). Stamens 8—32 (12—19 in ours). Pods erect, linear, opening from the tip downwards. (Gk. *polys*=many, *anisos*=not equal; referring to the stamens.) E.

F. trachysperma T. & G.

SARRACENIACEAE**Pitcher-plant Family**

Marsh herbs. Leaves all basal, *tubular or pitcher-shaped*. Flowers large, nodding, on scapes. Sepals 4—5 (ours), hypogynous, imbricated, persistent. Petals none or 5 (ours), imbricated, hypogynous, deciduous. Stamens many; anthers versatile. Ovary 3—5-celled; style terminal, peltate or lobed (ours) or simple. Capsule loculicidal. Seed small, reticulate, many, in many rows.

DARLINGTONIA

Perennial (ours), with long creeping rootstocks (ours). Sepals narrow, without bracts at base. Petals ovate-oblong with small ovate tip. Stamens 12—15. Ovary top-shaped, 5-celled; style short, with 5 linear club-shaped lobes. Capsule 5-valved. Seeds obovate-clavate, densely soft-spiny. (Honor of Wm. Darlington, an American botanist.) U. (*Chrysamphora californica*.)

D. californica T. & G. (Pitcher Plant)

DROSERACEAE**Sundew Family**

Herbs, biennial or perennial, *glandular-pubescent, exuding a copious clear viscid liquid*. Leaves mostly basal. Flowers perfect. Calyx persistent, 4—5-parted or the

sepals distinct and imbricated. Petals 5, hypogynous, distinct or slightly united at base. Stamens 4—20, hypogynous or perigynous, anthers versatile. Ovary free (ours) or its base adherent to the calyx, globose or ovoid, 1—5-celled; styles 1—5 and simple to 2-parted. Capsule loculicidal. Seeds several to many.

DROSERA**SUNDEW**

Plants of peat-bogs, often reddish. Leaves with glandular hairs which hold insects. Flowers in scapose racemes. Calyx deeply 4—8-parted. Petals spatulate. Stamens 5. Ovary 1-celled; styles 2—5, distinct or united at base, often deeply 2-parted so as to appear twice as many, or fimbriate. Capsule 3—5-celled. Seeds many. (Gk. *droseros*=dewy; the leaf-glands exude drops of clear liquid.)

A. Leaf-blade not longer than wide, orbicular or transversely elliptical. W. E.

D. rotundifolia L. (Round-leaved Sundew)

AA. Leaf-blade much longer than wide, linear to obovate-spatulate. C. (*D. longifolia* for our region.)

D. anglica Huds. (Long-leaved Sundew)

CRASSULACEAE**Stone-crop Family**

Herbs or somewhat shrubby, *mostly fleshy*. Leaves alternate or opposite, *fleshy*; stipules none. Flowers cymose, or rarely racemose or solitary, regular, symmetrical, mostly perfect. Calyx persistent, mostly 4—5-parted or -lobed. Petals as many as the calyx-segments, distinct or somewhat united, usually persistent, rarely none. Stamens as many or twice as many as the petals. Carpels as many as the sepals, *superior, distinct or united below*, each usually from the axil of a scale; styles thread-like or awl-shaped. Fruit a follicle, 1-celled, opening along the inner edge. Seeds minute, rarely 1—few, usually numerous, in 2 rows.

A. Leaves opposite.

B. Flowers solitary in the leaf-axils; leaves 2—6 mm. long; petals greenish, not over 2 mm. long. TILLAEASTRUM (p. 193)

BB. Flowers clustered in the leaf-axils; leaves 1.5—3 mm. long; petals greenish, about 1 mm. long. TILLAEA (p. 193)

BBB. Flowers in terminal cymes; leaves 5—8 mm. long; petals yellow, about 6 mm. long. SEDUM (p. 194)

AA. Leaves alternate.

C. Petals more or less united.

D. Corolla tubular, yellow, its lobes erect; basal leaves acute.

DUDLEYA (p. 194)

DD. Corolla short-campanulate or rotate, yellow or red, its lobes spreading; basal leaves obtuse.

GORMANIA (p. 194)

CC. Petals distinct.

SEDUM (p. 194)

TILLAEA**PIGMY-WEED**

Annual, glabrous, minute. Leaves opposite, entire. Flowers very small, axillary, clustered. Calyx 3—5-parted. Petals distinct or united at the base. Carpels distinct, 1—2-seeded. (Honor of M. A. Tilli, an Italian botanist.) U. C. (*T. minima*.)

T. erecta H. & A.

TILLAEASTRUM**PIGMY-WEED**

Annual, glabrous, small or minute, sometimes aquatic. Leaves opposite, entire. Flowers axillary, solitary, very small. Sepals mostly 4, distinct. Petals distinct or

united at base. Carpels distinct, few- to many-seeded. (Probably *Tillaea*, +L. aster=a contemptuous diminutive suffix; from their lack of beauty.)

A. Leaves obtuse, 4—6 mm. long; flowers sessile or nearly so, the pedicels elongating but little in fruit. E. (*Tillaea angustifolia*.)

T. aquaticum Brit.

AA. Leaves acute, 2—4 mm. long; flowers with pedicels at least equal to the calyx, eventually as long as the leaves or longer. E.

T. drummondii Brit.

DUDLEYA

Perennial. Basal leaves flat, linear to ovate; stem-leaves usually much shorter and relatively wider, sessile or clasping. Flowers yellow or orange or red or rarely white, mostly in panicles. Calyx conspicuous, 5-lobed; lobes linear-lanceolate to ovate. Petals united below middle, erect or somewhat spreading at tip. Stamens 10, distinct. Carpels erect, many-seeded. (Honor of W. R. Dudley, an American botanist.) U. (*Cotyledon farinosa*.)

D. farinosa Brit.

GORMANIA

Low, *Sedum*-like, perennial by horizontal rootstocks. Basal leaves spatulate to obovate or nearly orbicular, stem-leaves similar but smaller. Flowers cymose or thyrsoïd, yellow to red. Calyx mostly deeply 5-lobed. Petals united below middle, somewhat spreading above. Stamens 10, on the corolla. Carpels many-seeded, united below, erect or nearly so even in fruit. (Honor of M. W. Gorman, an American botanist.)

A. Corolla red or pink. U. G. laxa Brit.

AA. Corolla yellow.

B. Corolla-segments long-acuminate, much exceeding the filaments; pedicels mostly shorter than the calyx. W. C. E. (*Sedum oreganum*.)

G. oregana Brit.

BB. Corolla-segments acute to acuminate, little longer than the filaments; pedicels mostly longer than the calyx.

C. Leaves spatulate. E. (*Cotyledon oregonensis*.)

G. watsoni Brit.

CC. Leaves orbicular. E. (*Sedum debile*.)

G. debilis Brit.

SEDUM

STONE-CROP

Annual or perennial, mostly glabrous; stem erect or decumbent. Leaves alternate in most, often imbricate, entire or dentate. Flowers perfect or dioicous, in racemes or cymes; clusters often 1-sided. Calyx 4—5-lobed or -parted. Petals distinct or some of them united at the very base, in ours yellow or purple. Stamens 8 or 10, perigynous, the alternate ones usually attached to the petals. Carpels distinct or united at the very base, few- to many-seeded. (L. sedere—to sit; because the basal tuft of leaves is often flat on the rocks.)

A. Leaves spatulate or obovate, widest above their middle, flat.

B. Flowers purple, dioicous; racemes not 1-sided. C. E. (*Rhodiola integrifolia*; *S. rhodiola*.)

S. integrifolium Nels.

BB. Flowers yellow, perfect; racemes 1-sided.

C. Follicles erect or nearly so; basal leaves spatulate, with line of pits underneath near margin. W. E. *S. spathulifolium* Hook.

- CC. Follicles widely spreading; leaves without a line of pits.
 D. Leaves of sterile shoots opposite; cyme-branches short, mostly simple. W.
 C. E. *S. divergens* Wats.
 DD. Leaves alternate; cyme-branches long, forked.
 E. Biennial, 2.5 dm. or less high, not forming off-sets. C. (*S. divaricatum*.)
S. leibergii Brit.
 EE. Perennial, 1 dm. or less high, forming off-sets. W.
S. woodii Brit.
 AA. Leaves linear to ovate, widest at or below their middle, terete or flat.
 F. Perennial; leaves linear to lanceolate.
 G. Leaves linear, not ciliate; follicles erect or nearly so. W. C. E.
S. stenopetalum Pursh
 GG. Leaves linear-lanceolate to lanceolate; follicles widely spreading.
 H. Leaves not ciliate. W. C. E. (*S. uniflorum*.)
S. douglasii Hook.
 HH. Lower leaves ciliate. U.
S. ciliosum How.
 FF. Annual; leaves oblong or ovate-oblong, 5—12 mm. long, 2—4 mm. wide. W.
 (*S. pumilum*.) *S. radiatum* Wats.

SAXIFRAGACEAE

Saxifrage Family

Herbs but sometimes shrubby; juice watery. Leaves opposite or alternate, simple or compound, often palmately veined; stipules none or present. Flowers mostly perfect. Sepals 4—5, united to nearly distinct. Petals 0 or 4 or 5, alternate with the sepals. Stamens as many or twice as many as the sepals, rarely fewer, on the throat of the calyx. Ovary superior or partly inferior, 1—3-celled or rarely more-celled; placentae parietal or axial; styles distinct or somewhat united. Fruit a capsule; follicles usually separate at tip, opening along the inner edge. Seeds numerous or rarely several.

- A. Leaves centrally peltate, orbicular, 9—14-lobed, sharply serrate, 1—4 dm. wide.
 PELTIPHYLLUM (p. 199)

- AA. Leaves not peltate.

- B. Leaves entire.

- C. Leaf-blade widest below its middle; flowers solitary; staminodia present; carpels 3—4, united. PARNASSIA (p. 203)

- CC. Leaf-blade widest at or above its middle; flowers not solitary; staminodia none; carpels 2, distinct at least above. SAXIFRAGA (p. 197)

- BB. Leaves not entire.

- D. Either ovary 2-celled and placentae axial or basal, or else carpels separate.

- E. Stamens 10; leaf-blade widest above its middle or else narrower than ovate (except in many *Saxifraga*).

- F. Carpels distinct; leaves 2.5—15 cm. long, coriaceous, glabrous on both sides, coarsely serrate above the middle. LEPTARRHENA (p. 196)

- FF. Carpels united at least below; leaves not as above in all points.

- G. Leaf-blade jointed to the petiole. SAXIFRAGOPSIS (p. 199)

- GG. Leaf-blade not jointed to the petiole. SAXIFRAGA (p. 197)

- EE. Stamens 5; leaf-blade either widest at or below its middle and ovate or wider, or else 3—5-foliate.

- H. Ovary free from the calyx-tube, superior. BOLANDRA (p. 196)

- HH. Ovary partly united to the calyx-tube, partly inferior.

- I. Rhizome short, bulblet-bearing, with terminal flower-stalk.
HEMIEVA (p. 197)
- II. Rhizome elongated and horizontal, without bulblets, with lateral flower-stalks.
 - J. Sepals imbricate; petals persistent; seed winged.
SULLIVANTIA (p. 197)
 - JJ. Sepals valvate; petals deciduous; seed wingless. BOYKINIA (p. 196)
- DD. Ovary 1-celled; placentae parietal or basal.
- K. Sepals 4; petals 0 or 4; stamens 3 or 8.
 - L. Flowers solitary in the forks of the upper branches; petals none; stamens 8; leaves crenate but not lobed, never with young plants where blade joins petiole.
CHRYOSPLENIUM (p. 202)
 - LL. Flowers in racemes; petals 4; stamens 3; leaves lobed, often with young plant where blade joins petiole.
LEPTAXIS (p. 201)
- KK. Sepals 5; petals 5; stamens 5 or 10.
- M. Carpels 3.
LITHOPHRAGMA (p. 201)
- MM. Carpels 2.
- N. Flowers in panicles or spikes.
HEUCHERA (p. 200)
- NN. Flowers in racemes.
 - O. Petals entire; carpels very unequal.
TIARELLA (p. 199)
 - OO. Petals pinnatifid or laciniate; carpels about equal.
 - P. Calyx-cup longer than the free calyx-segments; capsule tapering into a beak.
TELLIMA (p. 201)
 - PP. Calyx-cup shorter than the free calyx-segments; capsule abruptly beaked or beakless.
MITELLA (p. 202)

LEPTARRHENA

Perennial. Leaves alternate, evergreen, mostly basal, a few on the flower-stalk; blade leathery, toothed, narrowed into petiole-like base. Flowers in thyrsoid-paniculate cymes. Calyx-cup flattish, about as long as the lobes; segments 5, erect. Corolla white, regular; petals narrow, wider upward, persistent. Stamens 10. Ovary slightly inferior; carpels united only at base. Follicles erect except the tips. Seeds produced into a tail or erect end. (Gk. leptos=small, arren=male; probably referring to the 1-celled anthers.) W. C. (*L. amplexifolia*.)

L. pyrolifolia R. Br.

BOLANDRA

Perennial, glabrous or glandular-puberulent; stem leafy. Leaf-blade reniform; at least the stem-leaves with conspicuous stipules. Flowers in more or less leafy-bracted panicles. Calyx-tube deeply urn-shaped; segments 5, long-attenuate. Petals purplish, narrowly subulate-lanceolate, long-attenuate, persistent. Stamens 5, opposite the sepals. Ovary superior; placentae axial. Follicles 2, ovate-lanceolate, united below. (Honor of H. N. Bolander, an American botanist.) C. (*B. californica* for our region.)

B. oregana Wats.

BOYKINIA (Therophon)

Perennial, glandular-pubescent. Flowers in panicles on lateral leafy shoots. Leaf-blades reniform, variously cleft or lobed, dentate or crenate; stipules none or leafy or mere bristles. Calyx-tube campanulate or urn-shaped or turbinate; segments 5, lanceolate

or obovate-lanceolate. Petals white, obovate or spatulate, often short-clawed. Stamens 5, opposite the sepals. Ovary $\frac{1}{2}$ inferior, 2-celled; styles 2; placentae axial. Follicle-beaks 2, divergent. Seeds shining. (Honor of a Dr. Boykin, of Georgia.)

A. Petals white.

B. Stipules none or mere bristles. W. C. (*T. majus intermedium*.)

B. major Gray

BB. Stipules wider, scarious or foliaceous. W. C. (*T. vancouverense*; *T. elatum*.)

B. occidentalis T. & G.

AA. Petals dark-purple. E. *B. heucheriformis* Nels.

SULLIVANTIA

Perennial, acaulescent, slender; stems scape-like. Leaves alternate, mostly basal, only 1 on the stem; blades kidney-shaped to orbicular, shallow-lobed, often coarsely toothed, cordate at base; petiole long. Flowers in paniced cymes. Calyx-tube campanulate; segments 5, erect, shorter than the tube. Corolla white or whitish, regular. Petals persistent, clawed. Stamens 5. Ovary fully $\frac{1}{2}$ inferior; carpels united to the beaks. Follicles erect, included in the calyx-tube. Seed winged. (Honor of W. S. Sullivant, an American bryologist.) W. E.

S. oregana Wats.

HEMIEVA

Perennials, glandular-puberulent. Basal leaves ternately divided and crenate, or crenate only; stem-leaves with stipules. Flowers in a panicle. Calyx-tube campanulate or urn-shaped; segments 5, triangular-lanceolate. Petals obovate, clawed. Stamens 5, opposite the sepals, erect. Ovary $\frac{1}{2}$ — $\frac{2}{3}$ inferior, 2-celled; placentae axial; styles distinct. (Possibly Gk. hemi= $\frac{1}{2}$, L. aevum=an age; in reference to its half-perennial form, thru budding in the leaf-axils.)

A. Petals white, with short claw; ovary $\frac{1}{2}$ inferior. C. E.

H. ranunculifolia Raf.

AA. Petals violet, with long claw; ovary $\frac{2}{3}$ inferior. E.

H. violacea Wheel.

SAXIFRAGA

SAXIFRAGE

Herbs but sometimes shrubby, chiefly perennial. Leaves mostly alternate (so in ours), simple; petioles usually sheathing at base. Flowers small, in cymes or corymbs or racemes or panicles. Sepals 5. Petals on the calyx-tube when there is one, entire or 2-toothed. Stamens 10, with or below the petals. Carpels usually 2, rarely 3—6; ovary of as many cells; fruit with as many beaks. (L. saxum=rock, frangere—to break; because many species grow in rock-clefts.)

A. Leaves not all basal.

B. Leaves entire; petals not always entirely white; plants with perennial leafy shoots.

C. Leaves not spine-tipped, obtuse.

D. Filaments clavate; petals white, 4—5.5 mm. long. C. (*S. ledifolia*.)

S. tolmiei T. & G.

DD. Filaments subulate; petals light yellow, 6—7 mm. long. W.

S. serpyllifolia Pursh

CC. Leaves spine-tipped, acute. W. E. (*S. austromontana*; *S. scherleroides* for our region.)

S. bronchialis L.

- BB. Most of the leaves not entire; petals white.
 - E. Plants with perennial very leafy shoots.
 - F. Leaves cleft; sepals united only at base; petals 5—7 mm. long; leaf-blade 7—21 mm. long. W. C. E.
S. caespitosa L.
 - FF. Leaves lobed; sepals united to the middle; petals 1.5—3.5 mm. long; leaf-blade 3—9 mm. long. C. E. (*S. oregonensis*).
S. adscendens L.
 - EE. Plants without perennial leafy branches; flowering stems annual.
 - G. Calyx rotate; leaf-blade reniform to rounded, 2—8 cm. wide. W. C. E.
S. mertensiana Bong.
 - GG. Calyx campanulate; leaf-blades reniform to oblong; less than 2 cm. wide.
 - H. Sepals acute or acuminate; leaf-blades ovate to oblong, many of them 3-lobed. W. *S. nuttallii* Small
 - HH. Sepals obtuse; leaf-blade rounded to reniform, 5—7-lobed. C. E.
S. debilis Engelm.
- AA. Leaves all basal.
 - I. Filaments subulate to linear.
 - J. Petals none; leaves narrowed to petiole-like bases. E.
S. apetala Pip.
 - JJ. Petals present.
 - K. Leaves narrowed to sheathing bases which are not petiole-like. W. C.
S. oregana How.
 - KK. Leaves with petioles or narrowed to petiole-like bases.
 - L. Flowers irregular, the 3 upper petals lanceolate or oblong-lanceolate, the 2 lower petals elliptic or spatulate-elliptic. W. C. E. (*S. nutkana* for our region.) *S. bongardi* Presl.
 - LL. Flowers regular, the petals about the same in form and length.
 - M. Cymules of the inflorescence compact at maturity.
 - N. Petals shorter than the sepals.
 - O. Petals obovate. E. (*S. nidifica* for our region.)
S. plantaginea Small
 - CO. Petals oblong to cuneate. E.
S. columbiana Pip.
 - NN. Petals longer than the sepals.
 - P. Calyx-lobes not reflexed at maturity. W. C. E.
S. fragosa Suks.
 - PP. Calyx-lobes reflexed at maturity.
 - Q. Petals with claws, 2-toothed at apex. W. (*Micranthes bidens*.) *S. bidens* (Small)
 - QQ. Petals without claws, rounded at apex. W. E. (*S. subapetala*.) *S. integrifolia* Hook.
 - MM. Cymules of the inflorescence open and often raceme-like at maturity.
 - R. Petals about as wide as long, rounded at base, sessile or with a very short claw.
 - S. Lower leaf-surface green, glabrous or nearly so; petals sessile. W. C. E. *S. californica* Gr.
 - SS. Lower leaf-surface red-tomentose; petals with short claw. W. C. (*Micranthes rufidula*; apparently *S. idahoensis*).
S. rufidula (Small)
 - RR. Petals spatulate, or obovate-cuneate, or cuneate at base.

- T. Leaves as long as or shorter than wide. U.
S. parvifolia Gr.
- TT. Leaves plainly longer than wide. U. C. (*S. claytoniaefolia*;
S. howellii.)
S. fallax Gr.
- II. Filaments clavate to spatulate.
- U. Leaf-blade fan-shaped. E.
S. lyallii Engler
- UU. Leaf-blade oblong to orbicular.
- V. Leaf-blade narrowed at base, neither cordate nor orbicular.
- W. Petals white with 2 yellow blotches below the middle. U. (*S. re-
flexa* for our region.)
S. marshallii Gr.
- WW. Petals totally white.
- X. Cymules of the inflorescence permanently compact. W. C.
S. occidentalis Wats.
- XX. Cymules of the inflorescence lax and open. C. E.
S. saximontana Nels.
- VV. Leaf-blade orbicular or nearly so.
- Y. Flowers in a compact terminal head. W. C. E.
S. nelsoniana Don.
- YY. Flowers in a narrow spike-like panicle. W.
S. spicata Don.
- YYY. Flowers in open or corymb-like panicles. W. C. E. (*S. aestivalis*;
S. odontophylla.) *S. arguta* Don.

SAXIFRAGOPSIS

Perennial. Leaves alternate, simple, crowded on the caudex, remote on the flower-stem, grading into bracts above; petiole slender, persistent, scarious, ribbed, its base dilated; blade cuneate, toothed at apex or above the middle. Flowers numerous, in cymes; cymes in a thyrsoid panicle, with small ciliate bracts. Calyx-tube campanulate; segments 5, about the length of the tube. Petals spatulate, reflexed at maturity. Ovary partly inferior; carpels united below the middle. Follicles erect; their tips subulate; not diverging. Seed smooth. (*Saxifraga*=another genus of plants, Gk. *opsis*=form; hence *Saxifraga*-like.) U.
S. fragarioides Small

PELTIPHYLLUM

Perennial, rather coarse, acaulescent. Leaves alternate, all basal; blade suborbicular, shallowly lobed, toothed, peltate; petiole long, widely dilated at base. Flowers in wide terminal corymbose cymes, on scapes exceeding the leaves. Calyx-tube small, flat-tish; segments 5, longer than the tube. Petals wide, clawless, white or pinkish. Stamens 10. Ovary slightly inferior; carpels united only at base. Follicles more or less spreading. (Gk. *pelte*=a small shield, *phyllon*=leaf; the leaves are peltate.) C.

S. peltatum Engler

TIARELLA

COOL-WORT

Perennial. Stipules present. Flowers in racemes or panicles. Calyx-tube small, short-campanulate; segments 5, ovate or lanceolate. Petals either clawed and with oblong or elliptic blades, or else clawless and filiform. Stamens 10, exserted. Ovary 1-celled, almost entirely superior; placentae 2, parietal but almost basal. Capsule membranous;

carpels 2, very unequal. Seeds relatively few. (Diminutive of Gk. tiara=mitre or turban; from the form of the pistil.)

A. Leaves merely 3—5-lobed. C. E.

T. unifoliata Hook.

AA. Leaves with 3 leaflets.

B. Leaflets coarsely dentate. W. C.

T. trifoliata L. (3-leaved Cool-wort)

BB. Leaflets deeply lobed or cleft. W. C.

T. laciniata Hook.

HEUCHERA

ALUM-ROOT

Perennial; stems scape-like or leafy. Flowers in racemes or panicles. Calyx-tube varicus, often oblique; segments 5, ovate or oblong or triangular, erect or spreading, often very unequal. Petals obovate, spatulate or oblanceolate, often somewhat clawed. Stamens 5, opposite the sepals, erect. Ovary partly inferior, 1-celled; placentae 2, parietal; styles 2, distinct. Capsule 2-beaked. (Honor of J. H. Heucher, a German botanist.)

A. Flowers in a loose panicle.

B. Calyx-cup about as long as wide; stamens at least twice as long as the free calyx-segments.

C. Lobes of the basal leaves acute. W. C. E.

H. glabra Willd.

CC. Lobes of the basal leaves rounded.

D. Basal leaf-blades decidedly longer than wide.

E. Petioles and stems glabrous. C.

H. glaberrima Rydb.

EE. Petioles and lower portion of the stems hairy. W. C.

H. diversifolia Rydb.

DD. Basal leaf-blades not or hardly longer than wide. W. C. E. (*H. nuttallii*.)

H. micrantha Dougl.

BB. Calyx-cup about twice as long as wide; stamens $1\frac{1}{2}$ —2 times as long as the free calyx segments.

F. Leaf-blades cordate at base. E.

H. rubescens Torr.

FF. Leaf-blades cuneate to rounded at base. E.

H. cuneata How.

AA. Flowers in a spike or a spike-like panicle.

G. Stamens about equaling the free calyx-segments; calyx-cup hemispheric, densely hairy. W.

H. pilosissima F. & M.

GG. Stamens much shorter than the free calyx-segments; calyx-cup various, sometimes hairy.

H. Calyx 3—5 mm. long, its cup saucer-shaped to shortly campanulate.

I. Lobes of the leaf-blades again 3-lobed. E.

H. gracilis Rydb.

II. Lobes of the leaf-blades not again lobed.

J. Calyx campanulate, white or yellowish or pinkish, the free segments almost erect.

K. Plants glabrous or glandular-pubescent merely on scape and inflorescence. C. E. (*H. lloydii*; *H. grossulariifolia*.)

H. hallii Gray

KK. Plants more or less glandular-hirsute. (See NN.)

- JJ. Calyx saucer-shaped, green, the free segments spreading. E.
H. parvifolia Nutt.
- HH. Calyx 5—10 mm. long, its cup deeply campanulate to urn-shaped.
 L. Calyx greenish.
 M. Petioles and flowering branches villous. W.
H. cylindrica Dougl.
- MM. Petioles and flowering branches glabrous or minutely glandular-puberulent. E. *H. tenuifolia* Rydb.
- LL. Calyx yellowish.
 N. Leaf-lobes deep, broadly ovate. C.
H. suksdorfii Rydb.
- NN. Leaf-lobes shallow, rounded.
 O. Leaf-blade densely glandular-pubescent. C. E. (*H. ovalifolia alpina*.) *H. ovalifolia* Nutt.
- OO. Leaf-blade glabrous or hairy only on the veins or merely puberulent. E. (*H. glabella columbiana*.)
H. glabella T. & G.

LEPTAXIS

YOUTH-ON-AGE

Perennial. In ours the leaves often with young plants where blade joins petiole. Stipules present, membranous. Calyx-tube funnellform, in fruit splitting on one side, slightly irregular; segments 5, ascending. Petals subulate, persistent. Stamens 3, opposite the upper 3 sepals. Ovary superior, 1-celled; placentae parietal. Capsule with 2 long beaks, attenuate at base. (Apparently Gk. leptos=slender, +axis; referring to the raceme.) W. C.
L. menziesii Raf.

LITHOPHRAGMA

Perennial. Calyx-cup from campanulate or hemispheric to elongated-turbinate; segments 5, rounded to triangular. Petals white or rose-colored, clawed, digitately or pinnately divided, toothed or entire, much exceeding the sepals. Stamens 10, included. Ovary $1/5$ — $1/2$ inferior, 1-celled; placentae 3, parietal; styles 3, short. (Gk. lithos=a stone, phragma=an enclosure; probably referring to the hard capsule.)

- A. Calyx-tube campanulate; ovary wholly superior.
 B. Petals about 12 mm. long; calyx-tube more than 3 mm. wide. U.
L. campanulata How.
- BB. Petals 2—7 mm. long; calyx-tube less than 3 mm. wide. W. C. E. (*Tellima tenella*; *L. glabra*; *L. rupicola*; *L. bulbifera*.)
L. tenella Nutt. (Babies' Breath)
- AA. Calyx-tube turbinate or obconic; ovary $1/2$ inferior.
 C. Stem 1—3 dm. high; leaf-blades divided to near the base; calyx-tube elongated-obconic. U. *L. affinis* Gray
- CC. Stem 3—5 dm. high; leaf-blades not divided to near the base; calyx-tube short-turbinate. W. E. (*Tellima parviflora*.)
L. parviflora Nutt.

TELLIMA

FRINGE-CUP

Perennial, hirsute. Stipules small. Calyx-cup urn-shaped or deeply campanulate; segments 5, ovate, erect. Petals white or tinged with purple, spreading; claw cuneate; blade pinnately divided. Stamens 10, short, included. Ovary almost completely superior, 1-celled; placentae 2, parietal; styles 2; stigma capitate. Capsule opening between the 2 beaks. (An anagram of *Mitella*.)

- A. Only base of ovary adnate to calyx; calyx-tube 8 mm. long; flowers not fragrant.
W. C. *T. grandiflora* Dougl.
- AA. Lower half of ovary adnate to calyx; calyx-tube 6 mm. or less long.
B. Flowers fragrant; petals pinnately divided, spreading. Calyx-cup 5—6 mm. long.
W. *T. odorata* How.
- BB. Flowers not fragrant; petals 3—5-cleft at apex, or entire, erect. Calyx-cup 4 mm. long. W. C. E. (*Heuchera racemosa*.)
T. racemosa Gr.

MITELLA

BISHOP'S-CAP

Perennial, low, slender. Leaves alternate; blades rounded, cordate; petioles slender. Flowers small, in a slender simple spike or raceme. Calyx short, 5-cleft, adherent to the base of the ovary. Petals slender. Stamens 5 or 10, included. Ovary from 1/3 to wholly inferior, 1-celled; placentae 2, parietal or basal; styles 2, very short. Capsule short, 2-beaked, 2-valved at summit. Seeds several, smooth, shining. (Diminutive of *L. mitra*=a mitre or cap; referring to the form of the young pod.)

- A. Calyx green; petals pinnatifid.
B. Ovary almost wholly superior; stigmas entire; stems 1—3-leaved; plant with summer runners. W. C. E. (*Mitellastra caulescens*.)
M. caulescens Nutt.
- BB. Ovary almost wholly inferior; stigmas 2-lobed; stems leafless; plant without summer runners.
C. Stamens alternate with the sepals. W. C. E.
M. pentandra Hook.
- CC. Stamens opposite the sepals.
D. Leaves ovate-cordate. W.
M. ovalis Gr.
- DD. Leaves broadly reniform-cordate. C.
M. breweri Gray
- AA. Calyx white; petals trifold or entire.
E. Leaves angularly lobed; calyx-lobes acute; petals 3-cleft. E.
M. diversifolia Gr.
- EE. Leaves not angularly lobed; calyx-lobes obtuse.
F. Petals entire. E. *M. micrantha* Pip.
- FF. Petals 3-cleft or -parted.
G. Raceme not secund; mid-veins of sepals branched; petals 3-cleft, their lobes not divaricate. W. C. E.
M. trifida Pip.
- GG. Raceme secund; mid-veins of sepals simple; petals 3-parted, their lobes divaricate. E. *M. stauiopetala* Grah.

CHRYSOSPLENIUM

GOLDEN SAXIFRAGE

Low, mainly semi-aquatic, somewhat succulent. Flowers small, axillary (ours) or terminal, solitary (ours) or in corymbs. Calyx-cup saucer-shaped or campanulate; segments normally 4. Petals none. Stamens 4—10 (8 in ours), on margin of disk. Ovary about 3/4 superior, 1-celled, 2-lobed. Styles 2; placentae 2, parietal. (Gk. *chrysos*=gold, *splen*=the spleen; on account of some reputed medicinal quality.) W. C. (*C. scouleri*.)
C. glechomaefolium Nutt.

PARNASSIA

GRASS OF PARNASSUS

Glabrous, scapose. Leaves entire, palmately veined, the basal petioled; stem-leaf 1, sessile. Flowers solitary, terminal. Calyx 5-lobed nearly to the base; tube short. Petals persistent, pale-yellow or white. Fertile stamens 5, opposite the sepals; sterile stamens generally numerous, in a cluster at the base of each petal. Ovary superior or partly inferior, 1-celled; style very short or none; placentae 4, projecting inward; stigmas usually 4. Capsule 4-valved. Seeds numerous, winged. (Named by the Greeks after Mt. Parnassus.)

A. Leaves ovate to broadly oval; petals 16—20 mm. long, not fimbriate at base; sterile stamens 20—24 in a group. U.

P. californica Gr.

AA. Leaves cordate to reniform; petals 8—13 mm. long, very much fimbriate at base; sterile stamens 5—9 in a group. W. C. E. (*P. intermedia*.)

P. fimbriata König

HYDRANGEACEAE

Syringa Family

Shrubs (ours), or trees, sometimes vines. Leaves *opposite*, deciduous (ours), sometimes persistent; stipules none; blade simple, entire or toothed. Flowers usually perfect, often in cymes, those at the margin of the cyme sometimes sterile and conspicuously enlarged; cymes in racemes or corymbs or panicles. Sepals 4—10, united below, in sterile flowers, often conspicuously enlarged. Petals as many as the sepals. Stamens 8—many; filaments long. Ovary *wholly or partly inferior*; carpels 2—10, *united*. Capsule *urn-shaped to conic* or rarely globose. Seeds 1—many in each carpel.

A. Shrub low, spreading or trailing; stamens 10—12 or fewer; ovule and seed only 1 in each carpel; capsule beakless.

WHIPPLEA (p. 203)

AA. Shrub erect or spreading; stamens many; ovules and seeds many in each carpel; capsule beaked by the persistent style.

PHILADELPHUS (p. 203)

WHIPPLEA

Low, diffuse; branches rather tender; bark ultimately somewhat shreddy. Leaf-blade oval or ovate, shallowly few-toothed, 3-veined from base. Flowers small. Calyx-cup rather wide; segments 5—6, thin, scarcely longer than the cup. Petal-blades rhombic. Stamens 8—12, alternately longer and shorter. Ovary 3—5-celled; styles 3—5, distinct. Capsule globose, separating into 3—5 leathery 1-seeded carpels. (Honor of A. W. Whipple, who commanded a survey on the Pacific Coast.) W.

W. modesta Torr.

PHILADELPHUS

SYRINGA

Tall, branching. Leaf-blade toothed or entire, 3-veined from base. Flowers perfect, often fragrant, borne at the ends of short leafy branches, solitary or in small 3—9-flowered cymes, or forming false racemes or panicles. Calyx-segments 4, rarely 5, persistent, ovate to lanceolate, somewhat tomentulose inside. Petals white (ours) or ochroleucous, conspicuous, in most species rounded or retuse at the apex. Stamens 15—60, (in ours 25—60). Ovary at least $\frac{2}{3}$ inferior, 3—5-celled. Capsule obovoid, somewhat woody or leathery, loculicidal. Seeds numerous. (Honor of King Ptolemy Philadelphus, of Egypt. Why?)

- A. Lower leaf-surface pubescent all over; leaves usually dentate; styles united for $2/3$ their length. W. C. *P. gordonianus* Lindl.
 AA. Lower leaf-surface pubescent only on the veins, leaves entire or denticulate; styles united for $1/2$ their length or rarely more. E.
P. lewisii Pursh

GROSSULARIACEAE (Ribesaceae) Gooseberry Family

Shrubs; stems erect to prostrate, often prickly, sometimes with spines at base of petiole. *Leaves* alternate, simple, petioled, deciduous or persistent, on the lateral branches usually fascicled; blades rarely entire, palmately veined; petiole often dilated at base; stipules none or adnate to the petiole. *Flowers* bracted, small, regular, on short axillary branches, solitary or in umbels or racemes. *Sepals* distinct or united at base into a saucer-shaped or campanulate cup, 4—5. *Petals* small, as many as the sepals and alternate with them, on the calyx. *Stamens* as many as the sepals, opposite them. *Ovary* inferior; style 2—3-lobed; placentae 2—3, parietal. *Fruit* a berry, 1-celled. *Seeds* several to many.

RIBES

GOOSEBERRY or CURRANT

Leaves dentate to lobed. Flowers few to many in a cluster. Ovary and fruit smooth or glandular or spiny. Fruit various in color. (The Arabic name.)

- A. Stems not spiny nor prickly; pedicles jointed beneath the ovary, and fruit breaking off at this point.
 B. Flowers yellow.
 C. Calyx-segments 5—8 mm. long; calyx-tube 2—3 times as long as wide; berry yellow or red or black. E. (*R. tenuiflorum*.)
R. aureum Pursh (Golden Currant)
 CC. Calyx-segments 3 mm. long; sepals but very little united at base; berry red.
 C. E. *R. erythrocarpum* C. & B.
 BB. Flowers white or green or red.
 D. Calyx-tube saucer-shaped or almost none.
 E. Ovary glabrous; berry red, smooth.
 F. Sepals usually somewhat purplish; petals red; anther-cells parallel. C. E. (*R. ciliosum*.) *R. triste* Pall. (Swamp Red Currant)
 FF. Sepals and petals yellowish-green; anther-cells widely divergent; escaped from cultivation.
R. vulgare Lam. (Garden Red Currant)
 EE. Ovary hairy or glandular; berry black, hairy or glandular.
 G. Sepals greenish; berry without a bloom. E. (*R. petiolare*.)
R. hudsonianum Rich.
 GG. Sepals white; berry with a bloom.
 H. Ovary with sessile glands; bracts of the inflorescence widest above their middle; leaves 5—20 cm. wide, 5—7-lobed. W. C.
R. bracteosum Dougl. (Stink Currant)
 HH. Ovary with stalked glands; bracts of the inflorescence widest below their middle; leaves 5—10 cm. wide, 3—5-lobed.
 I. Bracts about equaling the pedicels; racemes pendent. W. C. (*R. howellii*; *R. laxiflorum* for our region.)
R. acerifolium How.
 II. Bracts not more than $1/2$ the length of the pedicels; racemes erect or ascending. W. C.
R. laxiflorum Pursh

- DD. Calyx-tube campanulate or cylindric.
 J. Racemes usually with 10—20 flowers; sepals red or rose; anthers without an apical gland.
 K. Leaves white-tomentose beneath; ovary with some curled whitish hairs among the gland-hairs; calyx 8—12 mm. or less long. W. C.
R. sanguineum Pursh (Red-flowered Currant)
 KK. Leaves not tomentose; ovary with gland-hairs only; calyx 6 mm. long. C. E.
R. nevadense Kell. (Rose-flowered Currant)
 JJ. Racemes usually with fewer than 10 flowers; sepals white or greenish; anthers with a conspicuous cup-shaped apical gland.
 L. Leaves glandular-dotted; inflorescence pendulous; berry red or orange, glabrous or slightly glandular. E.
R. cereum Dougl. (Squaw Currant)
 LL. Leaves densely glandular-pubescent; inflorescence spreading or ascending; berry black, glandular. E.
R. viscosissimum Pursh (Sticky Currant)
 AA. Some of the stems either spiny or prickly, or both.
 M. Flowers more than 4 in a cluster; calyx-tube saucer-shaped; berries glandular.
 N. Leaves glabrous or nearly so; berries black; racemes mostly 10—15-flowered. W. C. E.
R. lacustre Poir. (Swamp Gooseberry)
 NN. Leaves pubescent or glandular; berries red; racemes mostly 3—7-flowered. E. (*R. molle*.) *R. lentum* C. & R.
 MM. Flowers 1—4 in a cluster; calyx-tube campanulate or cylindric.
 O. Berry spiny or densely glandular-hairy or velvety-pubescent.
 P. Calyx green or yellow.
 Q. Berry velvety-pubescent; leaves 1—1.2 cm. wide; sepals yellow; petals yellow. U. *R. velutinum* Gr.
 QQ. Berry bristly; leaves 2—6 cm. wide; sepals green; petals white.
 R. Stem trailing; leaves densely pubescent beneath; petiole not glandular; anthers exserted. U. (*R. montanum*; *R. ambiguum*.)
R. binominatum Hel.
 RR. Stem erect or ascending; leaves pubescent beneath on the veins only; petiole glandular; anthers included. C. E. (*R. ambiguum*.)
R. watsonianum Koehne
 PP. Calyx purplish to red.
 S. Young twigs densely bristly. U.
R. menziesii Pursh
 SS. Young twigs not or very scantily bristly.
 T. Leaves 1.5—2.5 cm. wide; anthers mucronate-tipped; calyx-tube about 5—7 mm. long; not glandular; berry 1—2 cm. long, bristly. U. (*R. amictum*.) *R. roezli* Reg.
 TT. Leaves 2—3.5 cm. wide; anthers not mucronate-tipped; calyx-tube 3—5 mm. long; ovary densely stalked-glandular; berry 1—2 cm. long, densely glandular. W. C.
R. lobbii Gray (Gummy Gooseberry)
 TTT. Leaves 2.5—3.5 cm. wide; anthers not mucronate-tipped; calyx tube 2—3.5 mm. long; ovary not glandular; berry 2.5 cm. or more long, fleshy-spiny. U. *R. marshallii* Gr.
 OO. Berries smooth.
 U. Calyx-lobes longer than the tube; stamens decidedly longer than whole calyx.

- V. Calyx white; its segments narrowly lanceolate. E.
R. niveum Lindl.
- VV. Calyx greenish-purple, its segments oblong. W. C. E.
R. divaricatum Dougl.
- UU. Calyx-lobes equal to or shorter than the tube.
- W. Bracts much shorter than the pedicels; stamens scarcely longer than the whole calyx. E. (*R. oxyacanthoides* and *R. gracile* for our region; *R. inerme*.)
R. saxosum Hook.
- WW. Bracts nearly equaling the pedicels; stamens decidedly shorter than the whole calyx.
- X. Leaves 1.5—4 cm. wide; peduncles 2—5-flowered; calyx-tube slightly hairy, much longer than wide, cylindric; calyx-segments 2—4 mm. long. E.
R. cognatum Gr.
- XX. Leaves 3—7 cm. wide; peduncles 1—3-flowered; calyx-tube glabrous, hardly longer than wide, campanulate; calyx-segments 5—8 mm. long. E.
R. irriguum Dougl.

ROSACEAE

Rose Family

Herbs or shrubs or trees (not ours). Leaves usually alternate, simple or compound; stipules usually present. Flowers usually perfect, rarely dioicous or monoicous, solitary or clustered. Sepals normally 5, rarely 4 or 6—9, often with as many bractlets beneath, often united at base forming a disk or cup or tube. Petals as many as the sepals or none. Stamens 1—many, usually on the calyx; filaments distinct or rarely slightly united at the base. Pistils 1—many, usually wholly distinct. Ovary 1-celled; styles terminal or lateral or basal. Fruit akene or follicles or drupelets, sometimes on an enlarged receptacle. Seed 1—few.

A. Shrubs.

B. Leaves simple; plants not vines.

- C. Leaves 3-lobed at apex, fascicled, 6—25 mm. long, cuneate-obovate, white-tomentose beneath; plant 6—24 dm. high.
 KUNZIA (p. 219)

CC. Not as above in all points.

D. Leaves pinnately veined, or 1-veined, in some pinnately lobed.

- E. Petals none; styles very long and plumose in fruit; carpels 1-seeded.

CERCOCARPUS (p. 219)

EE. Petals present; styles not plumose in fruit; carpels 2- to several-seeded (except *Holodiscus*).

- F. Erect, branching; inflorescence not spicate; leaves not rosulate, not entire.

G. Leaves ovate, shallowly lobed; stamen-disk adherent, entire; ovules 2; seed 1.

HOLODISCUS (p. 210)

GG. Leaves mostly narrower than ovate, not lobed but often coarsely serrate; stamen-disk free at margin, not entire; ovules several; seeds several.

SPIRAEA (p. 208)

FF. Depressed caespitose; inflorescence spicate; leaves rosulate, entire.

PETROPHYTUM (p. 209)

DD. Leaves palmately veined, palmately-lobed or -cleft.

- H. Stems 1 dm. or less long, caespitose, creeping; plant alpine; leaves 3-parted and the segments again 2—4-lobed; flowers in racemes.

LUTKEA (p. 209)

- HH. Stems 5—24 dm. high, not caespitose, erect or ascending or divaricate;

- plant not alpine; leaves 3—5-lobed half way to the mid-vein or shallower; flowers in corymbs. PHYSOCARPUS (p. 208)
- BB. Either the leaves compound, or else the plants vines.
- I. Leaves compound; leaflets entire.
- J. Leaves 2-pinnate; leaflets many; petals white; twigs stellate-tomentose. CHAMAEBATIARIA (p. 210)
- JJ. Leaves 1-pinnate; leaflets 5—7; petals yellow; twigs silky-villous. DASIPHORA (p. 216)
- II. Either leaves simple or leaflets not entire.
- K. Fruit of drupelets usually united to form a pulpy berry; shrubs or herbs, some trailing, smooth or prickly. RUBUS (p. 219)
- KK. Fruit a globular or flask-shaped fleshy receptacle containing a few bony akenes; shrubs, none trailing, prickly. ROSA (p. 220)
- AA. Herbs.
- L. Leaves simple, 4—12 mm. long, deeply 3-lobed, the lobes 2—4-cleft; plant 2.5—20 cm. high; petals none. ALCHEMILLA (p. 217)
- LL. Not as above in all characters; petals present in most.
- M. Leaves ternately many times compound. ARUNCUS (p. 209)
- MM. Leaves not ternate or if so leaflets only 3.
- N. Leaves palmately- or ternately-veined or -lobed or -compound.
- O. Fruit of a few fleshy drupelets; vines, alpine; leaves scattered, alternate, distant. RUBUS (p. 219)
- OO. Fruit of dry akenes; not vines with scattered distant leaves.
- P. Leaves all 3-foliolate.
- Q. Flowers white; plants with runners which give rise to new plants at the joints; leaves all basal. FRAGARIA (p. 216)
- QQ. Flowers yellow; plants without runners; leaves usually not all basal.
- R. Petals oblanceolate; stamens 5; style lateral; leaflets 6—25 mm. long, 3—5-toothed at the apex. SIBBALDIA (p. 216)
- RR. Petals wider; stamens 20; style terminal or nearly so; leaflets often longer, usually with more teeth. POTENTILLA (p. 211)
- PP. Leaves or some of them not 3-foliolate. POTENTILLA (p. 211)
- NN. At least the basal leaves pinnately-veined or -lobed or -compound.
- S. Leaves simple, coarsely toothed; alpine caespitose plant; petals 8—9. DRYAS (p. 218)
- SS. Leaves either compound or deeply dissected; petals not 8—9.
- T. Calyx surrounded by a dense border of hooked prickles. AGRIMONIA (p. 218)
- TT. Calyx not surrounded by prickles.
- U. Flowers in a dense spike; petals none; calyx-segments 4; stamens 2—12; calyx constricted over the fruit. SANGUISORBA (p. 218)
- UU. Flowers not in spikes; petals present; calyx-segments rarely 4; stamens often more; calyx not constricted over the fruit.
- V. Style terminal.
- W. Style jointed to the ovary, deciduous; leaves pinnately compound.
- X. Stamens very near the base of the receptacle-cup on a ring-like thickening. POTENTILLA (p. 211)
- XX. Stamens well up on the receptacle-cup, ring-like thickening none. HORKELIA (p. 210)

WW. Style not jointed to the ovary, at least the lower portion persistent; basal leaves mostly lyrate-pinnatifid.

Y. Petals yellow or purplish.

Z. Calyx-segments reflexed; styles jointed above the middle, the top deciduous and leaving a hook, not plumose.

GEUM (p. 218)

ZZ. Calyx-segments erect or spreading; style not jointed, wholly persistent, hence not hooked, sometimes plumose.

SIEVERSIA (p. 219)

YY. Petals white.

FILIPENDULA (p. 210)

VV. Style lateral.

a. Petals dark purple; receptacle spongy. COMARUM (p. 215)

aa. Petals yellow; receptacle dry.

b. Leaflets opposite; style attached near the base of the ovary; flowers in cymes; plant without stolons.

DRYMOCALLIS (p. 217)

bb. Leaflets not opposite; style attached near the middle of the ovary; flowers solitary; plant with stolons.

ARGENTINA (p. 215)

PHYSOCARPUS (Opulaster, Neillia) NINE-BARK

Shrubs; bark shreddy. Leaves alternate, palmately 3—5-veined, more or less lobed, usually with stellate hairs. Flowers in corymbs. Calyx-cup hemispheric or nearly so; segments 5, persistent, stellate-hairy at least inside. Petals white or rarely pinkish. Stamens 20—40. Pistils 1—5; styles terminal. Follicles somewhat united at base; somewhat inflated. Seeds 2—4, obliquely pear-shaped, shining. (Gk. physa=a bellows, carpos=fruit; from the inflated follicles.)

A. Carpels usually 5, 8—10 mm. long; shrub 7 m. or less high; inflorescence-bracts linear-lanceolate. W. C. E. (*O. opulifolius*.)

P. capitatus Kuntze (Tall Nine-bark)

AA. Carpels usually 1—2, 3—5 mm. long; shrub 2 m. or less high.

B. Inflorescence-bracts lanceolate; follicles inflated. E. (*N. torreyi*.)

P. monogynus Coult.

BB. Inflorescence-bracts spatulate or cuneate; follicles laterally flat. E. (*O. pauciflorus*.)

P. malvaceus Kuntze

SPIRAEA

SPIRAEA

Shrubs. Leaves simple, pinnately veined, serrate or entire, evergreen or deciduous; stipules none. Flowers perfect (ours), in racemes or corymbs or panicles. Calyx-tube campanulate to turbinate; segments 5. Petals white to red. Stamens 15—70. Pistils 3—8, usually 5, distinct; styles terminal. Follicles leathery, not inflated. Seeds several (4 in ours), linear-lanceolate or oblong, tapering at both ends. (Gk. speiran=to twist; some species have twisted follicles.)

A. Flowers red.

B. Inflorescence flat-topped. W. C. E. (*S. arbuscula*.)

S. densiflora Nutt. (Flat Red Spiraea)

BB. Inflorescence not flat-topped.

C. Under side of leaves glabrous.

D. Twigs villous-puberulent. W. C. E.

S. menziesii Hook.

DD. Twigs glabrous. E. (*S. idahoensis*.)

S. roseata Rydb.

CC. Under side of leaves tomentose. W.

S. douglasii Hook. (Hard-hack)

AA. Flowers white.

E. Inflorescence flat-topped. W. C. E. (*S. lucida*.)

S. corymbosa Raf. (Flat White Spiraea)

EE. Inflorescence not flat-topped.

F. Lower leaf-surface tomentose. C.

S. tomentulosa Rydb.

FF. Lower leaf-surface not tomentose. C. E.

S. pyramidata Gr. (Pyramid-bush)

PETROPHYTUM (Petrophyton)

Shrubs, low, prostrate, caespitose, on rocks. Leaves oblanceolate or spatulate, entire, coriaceous, evergreen, crowded on the short branches. Flowers perfect, in racemes; racemes rarely compound. Calyx-tube hemispheric; segments 5. Petals white. Stamens about 20. Receptacle-disk entire-margined. Pistils 3—5; ovary and lower part of style very hairy; style terminal. Follicles leathery. Seeds 2—4, linear. (Gk. petros=a stone, phyton=a plant; referring to their rock habitat.)

A. Leaves 3-veined.

B. Sepals obtuse; petals obovate or oval; leaves glabrous or nearly so. W. (*Lutkea hendersoni*; *Spiraea hendersoni*.)

P. hendersoni Rydb.

BB. Sepals acuminate; petals spatulate or oblanceolate; leaves canescent. E. (*Spiraea cinerascens*.)

P. cinerascens Rydb.

AA. Leaves 1-veined. C. E. (*Spiraea caespitosa*.)

P. caespitosum Rydb.

LUTKEA

PARTRIDGE-FOOT

Shrubs, small, caespitose, decumbent or creeping. Leaves 2—3-ternately dissected, grooved above. Flowers perfect, in a raceme. Calyx-tube hemispheric; segments 5. Petals white. Stamens about 20. Receptacle-disk about 10-lobed. Pistils 4—6, distinct; styles terminal, deciduous. Follicles coriaceous. Seeds several, linear-lanceolate, acute at both ends. (Honor of F. P. Lutke, a Russian explorer.) W. C. (*L. sibbaldioides*.)

L. pectinata Kuntze

ARUNCUS

GOAT'S BEARD

Herbs, perennial, with thick rhizomes. Leaves 2—3 times ternately- or pinnately-dissected; stipules none. Flowers dioicous, in a large panicle with spike-like branches. Calyx-cup of staminate flowers flat or saucer-shaped, 5-angled; segments 3-angled; petals white; stamens 15—30; receptacle-disk 5-lobed: pistils 3—5, rudimentary; styles none. Pistillate flowers much smaller than the staminate: stamens rudimentary; pistils 3—5, distinct; styles obliquely terminal. Follicles oblong, cartilaginous. Seeds 6—12, attenuate at both ends. (*L. aruncus*=the beard of a goat; probably suggested by the long white spikes of flowers.) W. C. E. (*A. vulgaris*; *A. sylvestris*; *A. acuminatus*.)

A. aruncus Karst.

CHAMAEBATIARIA

Shrubs, less than 1 m. high (ours), densely much-branched (ours), somewhat stellate-hairy and scurfy. Leaves 2-pinnate or -pinnatifid, 2—4 cm. long (ours); leaflets many, small, entire (ours), obovate. Flowers in panicles. Calyx-cup turbinate; segments 5, erect. Petals erect, rounded, white (ours). Stamens about 60, on the calyx. Pistils 5, somewhat united below; style terminal. Follicles coriaceous. Seeds 4—8, terete. (Apparently Gk. chamai=on the ground, batis=a ray fish; referring to the low spreading form.) E. *C. millefolium* Max.

HOLODISCUS (Schizonotus, Sericotheca) OCEAN SPRAY

Shrubs, thornless. Leaves simple, toothed or lobed, deciduous; stipules none. Flowers in terminal panicles, numerous. Sepals 5, 3-veined, erect in fruit. Petals white or pinkish, short-clawed. Stamens about 20. Akenes long-hairy, membranous. Seeds broadly oblong. (Gk. holos=whole, diskos=a disk; the disk of the receptacle is entire-margined.)

A. Leaves grayish- or whitish-tomentose beneath, usually over 3 cm. long, acute to truncate at base. W. C. E. (*H. ariaefolia*.)

H. discolor Max.

AA. Leaves not at all tomentose beneath altho somewhat glandular and slightly hairy, 1—3 cm. long, cuneate at base. U. C.

H. glabrescens Hel.

FILIPENDULA

Herbs, perennial, with rootstocks. Leaves pinnately dissected; stipules present. Flowers in panicle-like or corymb-like cymes. Calyx-cup flat. Petals white (ours) Stamens 20—40, 10 shorter. Pistils 5—15, distinct, opposite the petals when of the same number. Akenes attenuate or stalked at base, coriaceous. Seeds terete. (L. filum=thread, pendulus=pendulous; said to refer to the roots.) (U.)? Howells says on Tillamook Co. (N.W.)

F. occidentalis How.

HORKELIA

Herbs, perennial, with scaly rootstocks or caudices. Leaves pinnately compound, usually with many leaflets. Flowers in cymes or panicles. Calyx-cup deeply campanulate to saucer-shaped; segments 5. Petals 5, white or rose or yellow. Stamens 5—20, in the throat of the calyx-tube. Filaments filiform, or somewhat petal-like. Receptacle flat to conic. Pistils 3 to numerous; styles long, slender, jointed to akene, finally deciduous. (Origin?)

A. Petals white or rose-colored.

B. Stipules of the lower leaves not dissected into linear-filiform segments.

C. Basal leaves with 20—36 leaflets. U.

H. sericata Wats.

CC. Basal leaves with 10—20 leaflets.

D. Petals oblong, obtuse at apex. U.

H. hendersoni How.

DD. Petals cuneate, truncate to emarginate at apex.

E. Leaflets cleft from nearly half way to nearly to the base into lanceolate to linear segments. C. E. (*H. fusca tenella*.)

H. tenella Rydb.

- EE. Leaflets merely toothed.
- F. Leaflets oval or ovate. C.
 - H. capitata* Lindl.
- FF. Leaflets obovate or cuneate.
- G. Stems 1—2 dm. high; stipules lanceolate; petals 2—3 mm. long, emarginate. E. *H. parviflora* Nutt.
- GG. Stems 2—6 dm. high; stipules ovate or ovate-lanceolate; petals 3—5 mm. long, truncate. E. (*H. pseudocapitata*).
 - H. fusca* Lindl.
- CCC. Basal leaves with 4—10 leaflets.
- H. Leaflets of basal leaves linear-oblong; petals light yellow at least when dry. U.
 - H. congesta* Hook.
- HH. Leaflets of basal leaves wider or else widest above their middle; petals white. C. E.
 - H. tridentata* Torr.
- BB. Stipules of the lower leaves dissected into linear-filiform hairy segments.
- I. Cyme open and loose; leaflets divided to the base into oblong or oval segments. U.
 - H. howellii* Rydb.
- II. Cymes fastigiately corymbose; leaflets merely 2—5-toothed or -cleft at apex.
- J. Plant with silky hairs; leaflets 8—10. U.
 - H. congesta* Hook.
- JJ. Plant with coarse stiff hairs; leaflets 10—20. C.
 - H. hirsuta* Lindl.
- III. Cymes fastigiately corymbose; leaflets divided to near the base into linear segments. U. C. (*H. caruifolia*).
 - H. daucifolia* Rydb.
- AA. Petals yellow.
- K. Leaflets 12 or fewer.
- L. Stipules dissected; leaflets linear-oblong; petals longer than the calyx-segments; filaments lanceolate. U.
 - H. congesta* Hook.
- LL. Stipules entire; leaflets obovate or orbicular; petals shorter than the calyx-segments; filaments filiform. E. (*Ivesia baileyi*).
 - H. baileyi* Rydb.
- KK. Leaflets 20 or more.
- M. Whole plant silvery-white; stamens 20. C. E. (*Ivesia pickeringii*).
 - H. pickeringii* Rydb.
- MM. Plant not silvery-white; stamens 5.
- N. Cyme flat-topped; sepals 2.5 mm. or less long; petals as long or longer than the calyx-segments. E. (*Ivesia tweedyi*).
 - H. utahensis* Rydb.
- NN. Cyme head-like; sepals about 5 mm. long; petals shorter than the calyx-segments. E. (*H. gordonii* *alpicola*; *Ivesia alpicola*).
 - H. gordonii* Hook.

POTENTILLA

5-FINGER

Herbs, annual or perennial. Leaves pinnately or digitately or ternately compound. Flowers usually in paniced cymes. Calyx-cup mostly hemispheric; segments 4—5. Petals 5, deciduous, obcordate to round, usually not clawed, yellow or white or dark purple. Stamens usually 20, in 3 series of 10+5+5 respectively, near the base of the calyx-cup; style near apex of ovary, jointed to it, deciduous. (Diminutive of *L. potens* = powerful; first applied to *Argentina anserina* which was thought to be medicinal.)

- A. Flowers solitary, axillary, on long peduncles; leaves palmately 3—5-foliolate.
LONGIPEDUNCULATAE (p. 214)
- AA. Flowers in cymes.
- B. Cymes very leafy, their leaves hardly reduced, many-flowered.
- C. Leaflets deeply dissected, the basal ones nearly to the base.
ARENICOLAE (p. 213)
- CC. Leaflets merely toothed.
SUPINAE (p. 212)
- BB. Cymes not leafy or very little so, their leaves mostly reduced to bracts..
- D. Leaves digitate or ternate.
- E. Basal leaves 3-foliolate.
F. Plant glabrous or nearly so; leaves not tomentose. FRIGIDAE (p. 214)
- FF. Plant slightly to densely villous or tomentose; leaves densely white tomentose beneath.
NIVEAE (p. 214)
- EE. Basal leaves 5—9-foliolate.
- G. Plants 1 dm. or less high, on high mountains.
- H. Stem glandular-puberulent; basal leaves 3—5-foliolate, puberulent, their leaflets 0.5—1 cm. long.
BREVIFOLIAE (p. 214)
- HH. Stem silky-strigose; basal leaves 5—7-foliolate, densely silky on both sides and somewhat tomentose beneath, their leaflets 1—2 cm. long.
RUBICLAULAE (p. 214)
- GG. Plants 1—4 dm. high.
- I. Stipules 2—3 cm. long.
GRACILAE (p. 213)
- II. Stipules 0.5—1.5 cm. long.
- J. Leaves somewhat tomentose beneath, and densely silky-villous with long hairs on both sides.
CONCINNAE (p. 214)
- JJ. Leaves merely pubescent with short hairs on both sides, or also puberulent beneath.
GRACILAE (p. 213)
- JJJ. Leaves silky-strigose on both sides, sometimes becoming glabrate.
AUREAE (p. 214)
- GGG. Plants more than 4 dm. high.
GRACILAE (p. 213)
- DD. Leaves odd-pinnate.
- K. Leaflets 3—7, more or less close together.
- L. Leaves densely silky on both sides and somewhat tomentose beneath.
RUBICLAULAE (p. 214)
- LL. Leaves more or less strigose-silky but not at all tomentose.
AUREAE (p. 214)
- LLL. Leaves merely puberulent.
BREVIFOLIAE (p. 214)
- KK. Leaflets 7—27, often well separated.
- M. Leaves grayish or whitish, densely and softly villous.
LEUCOPHYLLAE (p. 215)
- MM. Leaves green on both side or merely strigose.
- N. Petals white; bristles of the receptacle very long.
ARENICOLAE (p. 213)
- NN. Petals yellow; bristles of the receptacle not abnormally long.
MULTIJUGAE (p. 215)

Subgenus SUPINAE—Annual or biennial or perennial, leafy. Flowers small, in many-flowered cymes; leaves of the inflorescence very little reduced. Petals $\frac{1}{2}$ — $1\frac{1}{4}$ as long as the sepals, yellow or whitish, cuneate. Stamens often fewer than 10—20, thick and glandular below.

- A. Leaves all pinnate; leaflets 7—11; akenes gibbous. E.
P. paradoxa Nutt. (Bushy 5-finger)

AA. Lower leaves pinnate with 5 leaflets; upper leaves ternate; akenes not gibbous. E.
P. rivalis Nutt.

AAA. Leaves all ternate; akenes not gibbous.

B. Calyx-tube in fruit 5 mm. or less wide; petals about $\frac{1}{2}$ as long as the sepals; stamens about 10.

C. Stems with diffusely spreading branches; cymes rather wide, loose; leaflets oblanceolate. W. C. E. (*P. leucocarpa*.)

P. millegrana Engelm. (Diffuse 5-finger)

CC. Stems with erect or strongly ascending branches; cymes narrow, elongated; leaflets obovate. W. C. E. (*P. lateriflora*.)

P. biennis Gr.

BB. Calyx-tube in fruit 6—8 mm. wide; petals about as long as the sepals; stamens 15—20. W. C. E.

P. monspeliensis L. (Rough 5-finger)

Subgenus ARENICOLAE—Biennial or perennial. Leaves pinnate; leaflets of basal leaves 7—21, dissected. Flowers small, white. Receptacle bristly. E. (*P. newberryi arenicola*.)

P. newberryi Rydb.

Subgenus GRACILAE—Perennial, erect; stem in some retrorse-hirsute. Leaves digitately 5—9-foliolate or the upper ones, 3-foliolate, somewhat hairy; leaflets sometimes divided to near mid-vein into narrow divisions, mostly obovate or oblanceolate. Flowers cymose, usually rather few.

A. Leaflets toothed or cleft half way to the mid-vein or more.

B. Stem-leaves few, with 3—5-leaflets. E.

P. candida Rydb.

BB. Stem-leaves several to many; mostly with 7 leaflets. E. (*P. blaschkeana*; *P. longiloba*.)

P. flabelliformis L.

AA. Leaflets toothed less than half way to the mid-vein.

C. Stem densely retrorse-hirsute. E.

P. permollis Rydb.

CC. Stem either not densely hairy or not retrorse-hirsute.

D. Pubescence of the petioles spreading.

E. Leaflets densely and finely white-tomentose beneath, nearly glabrous above. W. E.

P. gracilis Dougl.

EE. Leaflets pubescent or hirsute but not tomentose beneath, somewhat pubescent above. E. (*P. dascia*.)

P. hallii Rydb.

DD. Pubescence of the petioles appressed or ascending.

F. Leaves densely white tomentose beneath, appressed-silky but green above. E.

P. dichroa Rydb.

FF. Leaves not white-tomentose beneath.

G. Leaves densely silky-villous at least beneath.

H. Cymes corymbosely flat-topped. E.

P. viridescens Rydb.

HH. Cymes in an almost head-like cluster. E.

P. glomerata Nels.

GG. Leaves pubescent or glabrate, green.

I. Leaflets dissected at least half way to the mid-vein.

J. Leaflets glabrous above, glabrous except on the veins beneath. E.

P. glabrata Rydb.

- JJ. Leaflets appressed, pubescent on both sides or glabrate above. E.
P. rectiformis Rydb.
- II. Leaflets dissected less than half way to the mid-vein.
- K. Leaflets strongly ribbed, rather firm; petals 6—8 mm. long. E.
 (*P. grosseserrata*.)
P. nuttallii Lehm.
- KK. Leaflets not strongly ribbed, thin; petals 10—12 mm. long. U.
P. macropetala Rydb.

Subgenus LONGIPEDUNCULATAE—Perennial. Leaves palmately 3—5-foliolate; leaflets oblanceolate, slightly silky and green above, densely tomentose beneath, dissected half-way to the mid-vein into oblong-lanceolate divergent segments. Flowers about 2 cm. in diameter, on long pedicels. W.

P. longipedunculata Rydb.

Subgenus AUREAE—Perennial; stems rather simple, ascending or erect, few-flowered, usually less than 3 dm. high. Leaves rather thin, 5—7-foliolate, usually digitate, rarely pinnate with leaflets close together. Pubescence silky-strigose or hirsute, not at all tomentose.

A. Leaflets silky-strigose beneath even when mature; stipules acuminate; calyx-tube 7—10 mm. wide in fruit; calyx-segments acute, 3—5 mm. long. C. E. (*P. dissecta*.)
P. diversifolia Lehm.

AA. Leaflets silky-strigose when young but glabrate when mature; stipules acute; calyx-tube 5—7 mm. wide in fruit; calyx-segments acuminate, 5—7 mm. long. C. E. (*P. dissecta glaucophylla*.)
P. glaucophylla Lehm.

Subgenus CONCINNAE—Perennial. Stems generally low, spreading, at last prostrate. Leaves digitately 5—7-foliolate, silky above, more or less tomentose or white-silky beneath. Cymes few-flowered. E.

P. fastigiata Nutt.

Subgenus NIVEAE—Mostly low and tufted (not over 3 dm. in ours). Leaves digitately 3-foliolate, more or less tomentose beneath.

A. Leaflets 2—4 cm. long; flowers 2—3 cm. wide; calyx-tube 15—20 mm. wide; bractlets elliptic to widely ovate or oval. W. C.

P. villosa Pall.

AA. Leaflets 1—1.5 cm. long; flowers 1.5—2 cm. wide; calyx-tube 7—9 mm. wide; bractlets lanceolate. C. E. *P. uniflora* Ledeb.

Subgenus FRIGIDAE—Low, often tufted. Leaves digitately 3-foliolate, not at all tomentose, coarsely toothed.

A. Stems less than 1 dm. high; stem-leaves few and reduced. E.

P. trina Nels.

AA. Stems 2—3 dm. high; stem-leaves not few, not or hardly reduced. W. C. E.

P. flabellifolia Hook.

Subgenus BREVIFOLIAE—Low, alpine. Stems erect or ascending, not over 1 dm. high (ours), few-leaved. Leaves pinnate or ternate; leaflets 3—5, nearly glabrous. C.

P. brevifolia Nutt.

Subgenus RUBICULAE—More or less caespitose. Stems decumbent (not ours) or ascending or erect, short, subscapose, few-leaved. Leaves pinnate or somewhat digitate; leaflets 5—7, near together, more or less tomentose beneath. E. (*P. filicaulis*.)

P. hippiana Lehm.

Subgenus LEUCOPHYLLAE—Perennial. Leaves pinnate; leaflets 5—13, grayish or whitish-silky or villous or tomentose specially beneath, coarsely toothed but not dissected. E.

P. bruceae Rydb.

Subgenus MULTIJUGAE—Perennial; stem erect to prostrate, usually less than 3 dm. high (except *P. drummondii*). Leaves hirsute or strigose, not tomentose, pinnate; leaflets 7—27 (in *P. drummondii* sometimes only 3 or 5), coarsely toothed or dissected.

A. Stems diffuse or spreading; pedicels arcuate-spreading at least in fruit. C. E.

P. klamathensis Rydb.

AA. Stems erect or ascending; pedicels erect or ascending, straight.

B. Leaflets dissected to near the mid-vein.

C. Stem sparingly appressed-silky; basal leaves with 15—25 leaflets; sepals acute.

E. *P. versicolor* Rydb.

CC. Stem glabrous up to the inflorescence; basal leaves with 11—13 leaflets; sepals acute. E.

P. decurrens Rydb.

CCC. Stem strigose; basal leaves with 7—19 leaflets; sepals acuminate. E.

P. wyomingensis Nels.

BB. Leaflets not dissected to near the mid-vein.

D. Leaflets of basal leaves 1—2 cm. long; calyx silky-hairy. W. C.

P. cascadiensis Rydb.

DD. Leaflets of basal leaves 1 cm. or less long; calyx stiff-hairy. (See CC.)

DDD. Leaflets of basal leaves 2—6 cm. long; calyx stiff-hairy. C.

P. drummondii Lehm.

ARGENTINA

SILVER-WEED

Herbs, perennial, with long runners. Leaves interrupted-pinnate; leaflets many. Flowers solitary, on long peduncles, in the axils of the basal leaves. Calyx-cup almost flat; segments usually 5 but often more. Petals yellow, broadly elliptic or almost orbicular, not at all clawed, obtuse, scarcely emarginate. Stamens 20—25, in 3 series, near base of calyx. Receptacle hemispheric. Pistils very many; style lateral, attached almost at the middle of the ovary, glabrous. (L. argentina=of silver; from the silvery-hairy leaves.)

A. Leaves silvery on both sides. W. C. E. (*A. anserina concolor*.)

A. argentea Rydb.

AA. Leaves silvery beneath, green above.

B. Stem and petiole and leaf-rachis densely hairy. W. E. (*Potentilla anserina*.)

A. anserina Rydb. (Goose Tansy)

BB. Stem and petiole and leaf-rachis glabrous or slightly appressed-hairy. W. (*Potentilla pacifica*; *A. occidentalis*.)

A. pacifica Rydb.

COMARUM

Herb, perennial, stout, dark-green, nearly glabrous; rhizome creeping. Leaves alternate, pinnate; leaflets 5—7; stipules large. Flowers in cymes, large. Calyx-cup flat; segments 5. Petals 5, shorter than the calyx-segments, acute, purple. Stamens numerous, on the large pubescent calyx-cup. Pistils many; style lateral. Receptacle pubescent, becoming spongy in fruit. Akene glabrous. (Gk. komaros=the *Arbutus*, from the resemblance of the fruits.) W. E.

C. palustre L. (Purple Marsh-locks)

FRAGARIA

STRAWBERRY

Herbs, perennial, acaulescent; rhizomes scaly; runners prostrate, long, thin, rooting from the joints. Leaves ternate (ours), basal. Calyx-cup almost flat; segments 5. Petals white or reddish, broadly obovate to orbicular, obtuse. Stamens about 20, in 3 series, sometimes abortive, closely surrounding the base of the receptacle. Receptacle hemispheric or obconic, enlarged and red in fruit, very juicy, edible. Akenes very many; style lateral. (L. *fragans*=fragrant; from the odor of the fruit.)

A. Pubescence of the scapes and petioles spreading, generally at right angles or somewhat reflexed.

B. Leaves densely silky beneath, also somewhat tomentulose beneath; akenes in shallow pits.

C. Leaves strongly veined beneath; terminal leaflet plainly petiolulate; sepals acute or mucronate; often cultivated. W.

F. chiloensis Duch.

CC. Leaves not strongly veined beneath; leaflets all subsessile; sepals acuminate.

W. C. E. (*F. crinita*.) *F. cuneifolia* Nutt.

BB. Leaves slightly silky beneath, glabrate when old.

D. Leaflets subsessile; akenes not in pits, superficial. W. C. E. (*F. helleri*; partly *F. californica* for our region; *F. bracteata*.)

F. americana Brit.

DD. Leaflets petiolulate; akenes in pits.

E. Plant more or less glaucous; petals oval or orbicular, twice as long as the sepals.

F. Sepals and bractlets elliptic. E.

F. truncata Rydb.

FF. Sepals and bractlets lanceolate. E. (*F. suksdorfii*; partly *F. californica* for our region.) *F. platypetala* Rydb.

EE. Plant not glaucous; petals roundish-obovate, $1\frac{1}{2}$ times as long as the sepals. W.

F. grandiflora Ehrh.

AA. Pubescence of the scapes and petioles appressed or ascending; akenes in pits.

G. Flowers 2—3.5 cm. wide; leaves finely tomentulose beneath, strongly veined beneath. (See C.)

GG. Flowers 1—2 cm. wide; leaves not tomentulose beneath, not strongly veined beneath. E. (*F. glauca*; *F. pauciflora*.)

F. ovalis Rydb.

SIBBALDIA

Herbs somewhat shrubby at base, less than 1 dm. high (ours), perennial, low, tufted. Leaves 3-foliolate; stipules present. Calyx-tube saucer-shaped or cup-shaped, small; segments 5. Petals yellow, obovate or cuneate or oblanceolate (ours), hardly equaling the sepals. Stamens 5, on the calyx. Receptacle small. Pistils 5—20; styles lateral. W. C. E. (Honor of R. Sibbald, a Scotch botanist.)

S. procumbens L.

DASIPHORA

SHRUB 5-FINGER

Shrubs. Leaves pinnate, leathery; stipules sheathing, scarious; leaflets entire (ours). Flowers axillary. Calyx saucer-shaped; segments 5. Petals yellow (ours), nearly orbicular, not clawed, not emarginate. Stamens about 25, in 5 groups. Receptacle hemispheric. Pistils many; style at or below the middle of the ovary. Akenes densely

covered with long hairs. (Gk. dasys=shaggy, phoros=bearing; from the densely villous akenes.) W. C. E. (*D. fruticosa tenuifolia*; *Potentilla fruticosa*.)

D. fruticosa Rydb.

DRYMOCALLIS

Herbs, perennial. Leaves pinnate, glandular. Flowers in cymes. Calyx saucer-shaped or hemispheric; segments 5. Petals obovate to orbicular, not clawed, not emarginate, yellow or white. Stamens 20—30, in 5 clusters. Receptacle hemispheric. Pistils many; style nearly basal. (Gk. drymos=a brush-wood, kallos=beauty; from their growth in open woods.)

A. Styles fusiform, less than twice as long as the ovaries.

B. Calyx-segments lanceolate to ovate, acute, rarely acuminate.

C. Petals white or cream-colored, often turning more yellowish in drying.

D. Alpine; stems 2—5 dm. high; petals $1/3$ longer than the calyx-segments. E.

D. pseudorupestris Rydb.

DD. Not alpine; stems 3—10 dm. high; petals very little longer than the calyx-segments. E. (*D. convallaria*.)

D. corymbosa Rydb.

CC. Petals yellow during flowering.

E. Petals much longer than the calyx-segments.

F. Bractlets lanceolate to linear; calyx-segments lanceolate or ovate-lanceolate.

G. Plant slightly if at all viscid; stem-leaves reduced; inflorescence few-flowered; bractlets usually less than $1/2$ as long as the calyx-segments.

H. Herbage densely hairy. U. (*Potentilla ciliata*.)

D. ashlandica Rydb.

HH. Herbage nearly glabrous. E.

D. glabrata Rydb.

GG. Plant conspicuously viscid; stem-leaves hardly reduced; inflorescence many-flowered; bractlets much more than $1/2$ as long as the calyx-segments. W. C. E. (*Potentilla fissa* for our region; *Potentilla glutinosa*.)

D. valida Pip.

FF. Bractlets elliptic or ovate; calyx-segments broadly ovate. E. (*D. viscosa*.)

D. pumila Rydb.

EE. Petals slightly if at all longer than the calyx-segments. W. C. E. (*D. glandulosa incisa*; *Potentilla glandulosa*; *Potentilla reflexa* for our region.)

D. glandulosa Rydb.

BB. Calyx-segments oval to broadly ovate, rarely lanceolate, rounded and mucronate at apex. W. C. E. (*Potentilla wrangelliana*.)

D. wrangelliana Rydb.

AA. Styles filiform or nearly so, more than twice as long as the ovaries. C. E. (*Potentilla rhomboidea*.)

D. rhomboidea Rydb.

ALCHEMILLA

LADY'S MANTLE

Herbs, low. Leaves palmately-lobed or -compound; stipules adnate. Flowers small, in axillary clusters. Calyx-tube obconic, contracted at the throat; calyx-segments 4—5. Petals none (ours). Stamens 1—4. Pistils 1—4; style attached near base of ovary. (Alkemelyeh is the Arabic name.) W. C. E. (*A. arvensis occidentalis*.)

A. arvensis Scop.

SANGUISORBA

BURNET

Herbs. Leaves pinnate; leaflets petiolulate; stipules none. Flowers perfect or polygamous, in long-peduncled spikes. Calyx-tube turbinate, contracted at the throat; calyx-segments 4, petal-like. Petals none. Stamens 0 or 4—12. Pistils 1—3, free from the calyx; style terminal. Akene enclosed in the hardened 4-winged calyx-tube. (L. sanguis=blood; sorbere=to absorb; from reputed styptic properties.)

A. Leaflets toothed.

B. Calyx-segments white or slightly tinged with purple. W. E. (*S. latifolia*.)
S. sitchensis Mey.

BB. Calyx-segments dark-purple.

C. Stamens 2—3 times as long as the calyx-segments; filaments flattened and dilated specially towards the apex. C. (*S. media* for our region.)
S. menziesii Rydb.

CC. Stamens hardly if at all longer than the calyx-segments; filaments filiform. C. (*S. officinalis* for our region.)

S. microcephala Presl.

AA. Leaflets pectinate-pinnatifid. E. (*Poterium occidentale*.)
S. annua Nutt.

AGRIMONIA

AGRIMONY

Herbs, tall, perennial. Leaves odd-pinnate. Flowers yellow, small; racemes terminal, long, slender. Calyx-tube turbinate, somewhat contracted at the throat, surrounded by a dense border of hooked prickles or rarely 5-bracteolate; segments 5. Petals yellow. Stamens 5—15. Pistils 2, distinct; style terminal. Akenes 1—2, enclosed in the hardened calyx-tube. (Gk. agros=field, monos=alone; the chief of the field, on account of medicinal properties.) W. (*A. eupatoria* for our region.)

A. gyrosepala Wats.

DRYAS

ALPINE AVENS

Herbs, slightly shrubby, dwarf, matted, alpine (ours). Leaves simple, toothed, white-tomentose beneath (ours); margins revolute (ours). Flowers large, solitary, on slender scapes. Calyx open, salverform, shallow, 8—9-parted; segments linear (ours). Petals exceeding the calyx. Receptacle dry. Pistils many; style terminal, persistent, elongated, plumose. (Gk. dryas=a wood-nymph; from the wood habitat.) C. E.

D. octopetala L.

GEUM

AVENS

Herbs, perennial. Leaves mostly basal; basal leaves lyrate or pinnate; stem-leaves lobed or compound; stipules adnate. Flowers solitary or in corymbs. Calyx deeply 5-cleft; segments reflexed. Petals obtuse or emarginate. Stamens many. Receptacle dry, conic or clavate. Pistils many; style terminal, the base persistent, jointed above the middle, the joint becoming a hook in fruit (ours). (Gk. geyo=to taste well; some have edible roots.)

A. Leaf-segments and their lobes acute; terminal leaflet cuneate-obovate; receptacle downy-pubescent. E. *G. strictum* Ait. (Yellow Avens)

AA. Leaf-segments and their lobes obtuse; terminal leaflet broadly cordate; receptacle nearly naked. W. C. E. (*G. oregonense*.)

G. macrophyllum Willd. (Large-leaved Avens)

SIEVERSIA

Herbs, perennial, not tall; stem simple. Leaves mostly basal; basal-leaves pinnate; stem-leaves simple, often bract-like. Flowers rather large, in terminal cymes. Calyx deeply 5-cleft; segments 5. Petals obtuse or emarginate. Stamens many. Receptacle dry. Pistils many; style terminal, not jointed, straight, slender, persistent, often plumose, not hooked in fruit. (Origin? Possibly honor of some one.)

A. Flowers pale purplish; style plumose; plant hairy; stem-leaves not pinnatifid. W.

C. E. (*Geum triflorum*.) *S. ciliata* Pip.

AA. Flowers yellow; style glabrous; plant glabrous or nearly so; stem-leaves pinnatifid.

E. (*Geum rossii*; *S. turbinata*.)

S. rossii R. Br.

CERCOCARPUS**MOUNTAIN MAHOGANY**

Shrubs or small trees. Leaves alternate, simple, evergreen; stipules small, wholly adnate. Flowers axillary, solitary. Calyx-tube cylindric, long and pedicel-like, more or less persistent; segments 5, short, deciduous; bractlets none. Petals none. Stamens 15—25, on the calyx. Pistil 1, simple, free, erect; style terminal, villous. Akenes linear-oblong, terete, villous, tailed with the persistent plumose long style. (Gk. *kerkos*=a tail, *karpos*=a fruit; referring to the long-tailed akenes.)

A. Leaves resinous, oblong or lanceolate, 1-veined, margin revolute.

B. Shrub, leaves linear, 2—4 cm. long; calyx-lobes not half as long as the throat; tails of the akenes 2.5—5 cm. long. E.

C. intricatus Wats.

BB. Shrub or small tree; leaves oblong-lanceolate, 4—6 cm. long; calyx-lobes as long as the throat; tails of the akenes 5—7.5 cm. long. E.

C. ledifolius Nutt.

AA. Leaves not resinous, oblong or obovate, pinnately veined, margin not revolute. U.

E. (*C. betulaeifolius* for our region.)

C. parvifolius Nutt.

KUNZIA (Purshia)**ANTELOPE BRUSH**

Shrubs, diffusely branched. Leaves mostly fascicled, cuneate, 3-lobed at apex (ours), white-tomentose beneath (ours), greener above (ours); stipules triangular. Flowers yellow, subsessile, at the ends of short lateral leafy branches. Calyx persistent, funnelform, 5-lobed; bractlets none. Petals clawed, yellow. Stamens about 25, in the calyx-throat. Carpels 1—2, free, attenuate; style long. E. (Honor of Otto Kuntze, a botanist.)

K. tridentata Spreng.

RUBUS**BLACKBERRY, RASPBERRY**

Shrubs or herbs, erect or trailing, often prickly. Leaves simple or pinnately 3—7-foliolate; stipules adnate. Flowers white or purple, solitary or in panicles or corymbs. Calyx 5-lobed, persistent; tube short and open; bractlets none. Petals conspicuous, deciduous. Stamens numerous, on the calyx. Carpels numerous, rarely few, becoming drupelets; style nearly terminal, deciduous. Drupelets usually adhering to form 1 compound berry. (L. *ruber*=red; from the fruit; hence L. *rubus*=a bramble.)

A. Leaves 3—5-lobed or rarely -parted.

B. Stem erect, 9—24 dm. high, shrub, not prickly; leaves 10—30 cm. long; fruit of many drupelets. W. C. E. (*Bossekia parviflora*.)

R. parviflorus Nutt. (Thimble-berry)

- BB. Stem trailing, 0.5—12 dm. long; leaves 2.5—7.5 cm. long; fruit of 1—5 drupelets.
- C. Vine shrubby, with small recurved prickles; leaves shining, veins and petioles with recurved prickles beneath; carpels glabrous. W. C. E.
R. nivalis Dougl.
- CC. Vine herbaceous, without prickles; leaves not shining, not prickly; carpels tomentose. W. C. *R. lasiococcus* Gray
- AA. Leaves 3—5-foliolate.
- D. Herbaceous vine, trailing, without prickles. W. C. E. (*R. arcticus* for our region.) *R. pedatus* Sm.
- DD. Shrubs, either trailing vines or more erect plant, prickly.
- E. Flowers red; fruit yellow or garnet; spreading bush, not even the longer branches trailing. W. C. (*R. spectabilis menziesii*.)
R. spectabilis Pursh (Salmon-berry)
- EE. Flowers white; fruit black; most of the species with the longest branches inclined to trail, or all trailing.
- F. Leaves much dissected into 7—many small segments, evergreen; stems very coarse, very sharply and strongly recurved-prickly, ascending 12 dm. or less and then trailing. W. *R. laciniatus* Willd. (Evergreen Blackberry)
- FF. Leaves with 3—5 leaflets, not evergreen (except *R. ursinus* west of the Cascades); stems not strikingly coarse.
- G. Trailing vine; blackberry, carpels not pulling off from the receptacle in fruit. W. C. E. (*R. macropetalus*.)
R. ursinus C. & S. (Trailing Blackberry)
- GG. Stems erect or ascending, the long branches often somewhat trailing; raspberry, carpels pulling off from the receptacle in fruit.
- H. Stems not glaucous; fruit red. E.
R. strigosus Michx. (Wild Red Raspberry)
- HH. Stems glaucous; fruit black.
- I. Leaves glaucous beneath. W. C. E.
R. leucodermis Dougl. (Black-cap)
- II. Leaves green beneath. E.
R. hesperius Pip.

ROSA

ROSE

Shrubs, prickly. Leaves odd-pinnate; stipules adnate. Flowers large, solitary or in corymbs. Calyx urn-shaped; the tube contracted at the mouth, at length fleshy or berry-like, enclosing the pistils. Pistils numerous; style terminal or nearly so, somewhat exserted. Akenes crustaceous or bony. (Latin name.)

- A. Calyx-tube and fruit prickly.
- B. Flowers solitary at the ends of short leafy branches; fruit densely spiny. E. (*R. nutkana macdougali*.) *R. macdougali* Holz.
- BB. Flowers in corymbs; fruit not spiny. U.
R. spithamea Wats.
- AA. Calyx-tube and fruit not prickly.
- C. Calyx-segments deciduous when fruit is mature; leaflets doubly serrate.
- D. Sepals pinnatifid; leaflets densely resinous beneath, aromatic; spines recurved; prickles usually none. W.
R. rubiginosa L. (Sweet Brier)
- DD. Sepals not pinnatifid; leaflets not resinous beneath, not aromatic; spines straight; prickles usually present. W. C. E.
R. gymnocarpa Nutt. (Naked Rose)

CC. Calyx-segments persistent.

E. Infra-stipular spines none. E. (*R. blanda* for our region.)
R. *sayi* Schw. (Prickly Rose)

EE. Infra-stipular spines usually present.

F. Flowers solitary; fruit 2 cm. or less wide; rachis of leaves not prickly nor pubescent. W. C. E. R. *nutkana* Presl. (Nutka Rose)

FF. Flowers in corymbs, rarely solitary; fruit 1 cm. or less wide; rachis of leaves prickly or pubescent. W. C. (*R. californica* for our region.)

R. *pisocarpa* Gray (Bunched Rose)

MALACEAE (Pomaceae)

Apple Family

Trees or shrubs. Leaves alternate, simple or odd-pinnate; stipules caducous, free or nearly so. Flowers perfect, regular, white or reddish, in raceme-like or corymb-like clusters. Calyx-tube urn-shaped or campanulate, somewhat lined with a disk; segments 5. Petals 5, on the calyx-cup. Stamens mostly 20, on the calyx. Ovary inferior, compound; carpels 2—5, 2-ovuled; styles as many as the carpels. Fruit a pome.

A. Leaves pinnately compound.

SORBUS (p. 221)

AA. Leaves simple.

B. Leaves linear-lanceolate to oblanceolate; plant 1—2 m. high; flowers 1—2 in a cluster.

PERAPHYLLUM (p. 222)

BB. Leaves wider; plant usually taller; flower-clusters usually larger.

C. Smaller branches with stout thorns; flowers in corymbs; fruit with stony carpels.

CRATAEGUS (p. 222)

CC. Plant without thorns; fruit with papery carpels.

D. Flowers in corymbs; fruit yellowish-green, having the appearance of a small apple.

PYRUS (p. 221)

DD. Flowers in racemes; fruit black or purplish, having the appearance of a berry.

AMELANCHIER (p. 222)

SORBUS

MOUNTAIN ASH

Shrubs or small trees. Leaves odd-pinnate, deciduous. Flowers small, in terminal compound cymes. Calyx urn-shaped. Styles 3—5, distinct. Carpels 3—5, coriaceous, 1-celled, 2—5-ovuled, 1-seeded. Fruit small, globose or pyriform. (A Latin name for the Service-tree, *Pyrus domestica*.)

A. Leaflets dull, serrate only near the apex; fruit purple, glaucous. W. C. E. (*Pyrus occidentalis*.)

S. *occidentalis* Gr.

AA. Leaflets shining, serrate from near the base; fruit coral-red. W. C. E. (*Pyrus sitchensis*; *S. sambucifolia* for our region; *S. scopulina*.)

S. *sitchensis* Roem.

PYRUS

APPLE

Trees, small. Leaves deciduous, simple, more or less serrate, sometimes somewhat 3-lobed in ours. Flowers white to pink, in simple corymbs at the ends of short lateral branches. Calyx-tube urn-shaped. Styles 5, more or less united at base. Carpels 5, chartaceous in fruit, 2-seeded, 1-celled, wholly covered by the adnate calyx-tube. Fruit globose or oblong or pyriform, depressed at both ends, acid. (The Latin name of the pear.)

A. Fruit widest at or below the middle, without grit-cells.

B. Leaves often somewhat 3-lobed, white-pubescent beneath; fruit 8—12 mm. wide, 15—20 mm. long. W. (*Malus rivularis*.)

P. *rivularis* Bong. (Crab-apple)

BB. Leaves not lobed; fruit larger.

C. Leaves glabrate; calyx-lobes glabrate outside; fruit 3 cm. or less wide. W. E.
P. baccata L. (Siberian Crab)

CC. Leaves white-pubescent beneath; calyx-lobes white-pubescent outside; fruit mostly larger. W. E. *P. malus* L. (Cultivated Apple)

AA. Fruit widest above the middle, with grit-cells. W. E.

P. communis L. (Cultivated Pear)

AMELANCHIER

SERVICE-BERRY

Shrubs or small trees. Leaves simple, deciduous. Flowers white, in small racemes. Calyx-tube campanulate. Styles 3—5, united at base or distinct. Carpels 3—5, becoming membranous, incompletely 2-celled by a partition from the back, 1-seeded, wholly covered by the adherent calyx. Fruit small, berry-like, black or purplish, edible, sweet. (The French name for a cultivated hawthorn.)

A. Twigs pale or ashy.

B. Leaves cuneate at base. E. (*A. alnifolia* for our region.)

A. cuneata Pip.

BB. Leaves rounded at base.

C. Calyx-lobes erect; leaves 4 cm. or less long. U.

A. pallida Gr.

CC. Calyx-lobes reflexed; leaves 2.5—5 cm. long. E.

A. utahensis Koehne

AA. Twigs not ashy.

D. Leaves tomentose beneath when young.

E. Petals 12—15 mm. long. W. C. E.

A. florida Lindl.

EE. Petals about 8 mm. long. E.

A. oreophila Nels.

DD. Leaves glabrous even when young.

F. Leaves bright-green; petals about 2 cm. long. E.

A. cusickii Fer.

FF. Leaves whitish-green; petals 1—1.5 cm. long. E.

A. basalticola Pip.

PERAPHYLLUM

Shrubs, low, much branched. Leaves deciduous, linear-lanceolate or oblanceolate, crowded at the ends of the branchlets. Flowers white, solitary or 2—4 in an umbel. Calyx urn-shaped. Styles 2, rarely 3. Fruit a pome containing 2—3 almost distinct carpels, each 2-celled by a spurious partition; cells 1-seeded. Seeds angular, flattened. (Apparently Gk. per=thru, a=without, phyllon=a leaf; referring to the narrow leaves bunched at the branch-tips.) E.

P. ramosissimum Nutt.

CRATAEGUS

HAWTHORN

Shrubs or small trees, thorny. Leaves simple, toothed or lobed. Flowers white, in terminal corymbs. Calyx-tube urceolate. Stamens 5—20. Carpels 2—5, becoming bony 1-seeded nutlets, contiguous or united; styles distinct. Fruit drupe-like, globose or ovoid, crowned with the calyx-teeth. (Gk. kratos=strength; referring to the toughness of the wood.)

There is a "service-berry" in the wood to which the "apple" refers. It is a "service-berry" in the wood to which the "apple" refers. It is a "service-berry" in the wood to which the "apple" refers.

- A. Fruit black; spines 1—3 cm. long.
- B. Leaves lobed or incisely and doubly toothed; petiole with scattered glands. W.
E. (*C. brevispina*.) *C. douglasii* Lindl.
- BB. Leaves serrate, not incisely toothed or lobed; petiole glandless. E.
C. rivularis Nutt.
- AA. Fruit red; spines 4—6 cm. long.
- C. Leaves oval to orbicular. E.
C. sheridana Nels.
- CC. Leaves cuneate-obovate.
- D. Calyx and fruit glabrous. E.
C. columbiana How.
- DD. Calyx and fruit tomentose. E.
C. piperi Brit.

AMYGDALACEAE (Drupaceae) Peach Family

Shrubs or trees. Leaves alternate, simple, petioled; stipules small and caducous or none. Flowers regular, perfect or dioicous or polygamous. Calyx tubular or campanulate, deciduous; segments 5. Petals 5, on the calyx. Stamens 15—20, on the calyx. Pistils 1—5, distinct; style simple; ovary superior, 1-celled, 2-ovuled. Fruit 1—5 separate drupes, edible or not. Seed 1, bitter.

- A. Leaves mostly serrate; stipules present but caducous; flowers perfect, not with bad odor; carpels 1; fruit 1 drupe. PRUNUS (p. 223)
- AA. Leaves entire or undulate; stipules none; flowers dioicous, with bad odor; carpels 2—5; fruit 2—5 drupes. OSMARONIA (p. 223)

PRUNUS

PLUM, CHERRY

Shrubs or trees. Leaves serrate or undulate or entire. Flowers white or pink, in umbels or corymbs or racemes. Petals spreading. Style terminal. Fruit glabrous, with or without bloom, edible, or not; stone smooth or nearly so, globose or oval, or oblong and flat. (Latin name of the plum.)

- A. Fruit 15—20 mm. long; stone flattened; leaves convolute in the bud; flowers not in racemes. W. E. (*P. oregana*.)
P. subcordata Benth. (Plum)

- AA. Fruit 4—10 mm. long; stone subglobose; leaves conduplicate in the bud.
- B. Flowers in corymbs; fruit bright red; petiole without glands. W. C. E. (*P. emarginata villosa*; *P. mollis*.)
P. emarginata Walp. (Wild Cherry)

- BB. Flowers in racemes; fruit dark purple; petiole usually with 2 glands just below point of attachment to blade. W. E. (*P. melanocarpa*.)
P. demissa Dietr. (Choke-cherry)

OSMARONIA

INDIAN PLUM

Shrub. Leaves deciduous, entire or undulate; stipules none. Flowers polygamous or dioicous, in racemes; racemes loose, nodding, bracted, appearing with the leaves and from the same buds. Stamens 15, those of the fertile flowers all with abortive anthers. Carpels 5, distinct; styles lateral, jointed at base; ovules 2 in each carpel. Fruits 2—5, 1-seeded, blue-black with a bloom; pulp thin, not edible; stone smooth, somewhat flat. (Gk. *osmeres*=smelling; the flowers have an unpleasant odor.) W. C.

- O. cerasiformis* Gr.

LEGUMINACEAE (Fabaceae) Bean Family

Herbs or shrubs or trees, often vining. Leaves alternate, mostly pinnately or palmately or ternately compound; stipules present. Flowers irregular, *papilionaceous*, perfect or polygamo-dioicous, solitary or variously clustered. Calyx 4—5-toothed or -cleft, sometimes 2-lipped. Petals distinct or *somewhat united*, usually consisting of 1 wide upper one (standard) and 2 lateral ones (wings) and 2 lower usually united ones (keel). Stamens *monadelphous* or *diadelphous* or rarely distinct, 10 or 9 (not ours) or rarely 5. Pistil 1, *simple*; ovary superior, usually 1-celled, sometimes lengthwise 2-celled by the intrusion of the sutures, sometimes crosswise 2- to several-celled; style 1. Fruit a pod, dehiscent by 2 valves or indehiscent, sometimes breaking crosswise into joints. Seeds 1—many.

A. Trees, cultivated; stipules often spiny; leaves pinnately compound.

ROBINIA (p. 234)

AA. Shrubs.

B. Plant spiny; leaves simple, often becoming spines; branches not or hardly 4-angled, not conspicuously green.

ULEX (p. 225)

BB. Plant not spiny; leaves with 1—3 leaflets, not becoming spines; branches conspicuously 4-angled, dark green.

CYTISUS (p. 226)

AAA. Herbs, or somewhat shrubby at base.

C. Leaves with 3 leaflets.

D. Stamens distinct; stipules free; leaflets entire; flowers yellow, in terminal bracted racemes.

THERMOPSIS (p. 225)

DD. Stamens either monadelphous or diadelphous in groups of 9 and 1; stipules often adnate; leaflets serrate in most species; flowers not yellow in most, often in heads.

E. Flowers in heads or head-like umbels.

F. Leaflets entire; mature pod about 2.5 cm. long.

LOTUS (p. 233)

FF. Leaflets denticulate; mature pods 1 cm. or less long.

TRIFOLIUM (p. 230)

EE. Flowers in spikes or racemes, rarely in heads and then the pod coiled and the leaflets denticulate.

G. Leaflets not entire.

H. Flowers in spikes or heads, yellow or purple; pod curved or coiled, often spiny.

MEDICAGO (p. 230)

HH. Flowers in long racemes, yellow or white; pod straight, wrinkled.

MELILOTUS (p. 230)

GG. Leaflets entire.

I. Leaves punctate with dark glands or pellucid dots; pod 6 mm. long; seed 1.

PSORALEA (p. 234)

II. Leaves not punctate; pod 12 mm. or more long; seeds 2—many.

ASTRAGALUS (p. 234)

CC. Leaves palmately compound, with 5—16 leaflets, occasionally some leaves with only 3 leaflets.

J. Leaflets coarsely serrate or dentate.

TRIFOLIUM (p. 230)

JJ. Leaflets entire.

K. Leaflets 5—16, not punctate, often quite hairy; keel of the corolla acuminate; seeds 1 or more.

LUPINUS (p. 226)

KK. Leaflets 3—7, punctate with dark glands or pellucid dots, glabrous or with few hairs; keel of the corolla obtuse; seed 1.

PSORALEA (p. 234)

CCC. Leaves pinnately compound, with 4 or more leaflets or occasionally some leaves with fewer.

L. Leaves with an odd leaflet at the tip, without tendrils.

M. Herbage conspicuously glandular-dotted.

N. Leaflets 5—9, narrowly oblong to obovate, 1—1.2 cm. long; peduncles much exceeding the leaves, terminal; flowers deep-purple; stamens 5; pod not prickly, 1-seeded. PETALOSTEMUM (p. 234)

NN. Leaflets 13—17, oblong to oblong-lanceolate, 2.5—5 cm. long; peduncles about equaling the leaves, axillary; flowers ochroleucous; stamens 10; pod prickly with hooked prickles, 2—6-seeded. GLYCYRRHIZA (p. 239)

MM. Herbage not glandular-dotted; stamens 10; pod not prickly.

O. Flowers solitary or in umbels; pod linear, not jointed; leaflets 3—15. LOTUS (p. 233)

OO. Flowers in spikes or racemes, rarely solitary and then the pod not linear; leaflets often more.

P. Pod 2—4-jointed, reticulate. HEDYSARUM (p. 239)

PP. Pod not jointed, often veiny but hardly reticulate.

Q. Keel of the corolla acute or subulate at apex.

ARAGALLUS (p. 239)

QQ. Keel of the corolla obtuse at apex. ASTRAGALUS (p. 234)

LL. Leaves without an odd leaflet at the tip or often with tendrils.

R. Style terete above, with a tuft of hairs at tip. VICIA (p. 240)

RR. Style somewhat flat above, with hairs down the concave side for a short distance from the tip. LATHYRUS (p. 241)

THERMOPSIS

Herbs, perennial, stout; stems erect. Leaves 3-foliolate: leaflets petiolulate, entire; stipules foliaceous, free. Flowers yellow, in terminal bracted racemes; bracts herbaceous, persistent. Calyx 4—5-cleft to the middle; lobes equal or the 2 upper ones united. Standard roundish, shorter than the wings; wings oblong; keel nearly straight, obtuse, equaling the wings. Stamens 10, distinct. Pod narrow, flattish. Seeds few to many. (Gk. *thermos*=the lupine, *opsis*=like.)

A. Two upper calyx-lobes united into a 2-toothed segment.

B. Racemes short, loosely flowered; bracts ovate, acute, mostly shorter than the pedicels; calyx-teeth acute. U.

T. gracilis Hcw.

BB. Racemes long, densely flowered; bracts ovate-lanceolate, acuminate, mostly longer than the pedicels; calyx-teeth acuminate. U.

T. robusta How.

AA. Two upper calyx-lobes united only about as much as the others.

C. Leaflets oblong-oblancoate to obovate; plant with somewhat fleshy rootstock. W.

E. (*T. montana ovata*; apparently *T. arguta*.)

T. montana Nutt.

CC. Leaflets oval to narrowly elliptic; plant with woody caudex and roots. E.

T. xylorrhiza Nels.

ULEX

GORSE

Shrubs; branches stiff, spine-like. Leaves simple, linear or awl-shaped, stiff, very prickly. Flowers large, yellow, solitary or in racemes. Calyx membranous, mostly yellow, divided nearly to base into 2 lips; upper lip mostly 2-toothed, lower 3-toothed;

teeth short. Petals obtuse; standard ovate; wings and keel oblong. Stamens 10, monadelphous. Ovary sessile; ovules several to many; style glabrous. Pod ovoid to linear, flat and scarcely longer than the calyx in ours. (The Latin name.) W.

U. europaeus L.

CYTISUS

BROOM

Shrubs; branches green, angular. Leaves 1—3-foliolate; stipules small. Flowers solitary or in racemes, yellow (ours) or white. Calyx-tube campanulate; calyx-limb 2-lipped. Petals wide, clawed, free except the keel; keel obtuse. Stamens 10, monadelphous. Ovules many; style glabrous. Pod flat. Seeds several. (From *Cythus*, one of the *Cyclades*, where this or a related plant was first found.) W.

C. scoparius L. (Scotch Broom)

LUPINUS

LUPINE

Herbs, rarely shrubby at base. Leaves palmately 5—16-foliolate, rarely 1-foliolate (not ours); stipules small. Flowers in terminal racemes or spikes, mostly showy. Calyx deeply 2-lipped, often 2-bracted; upper lip 2-cleft or -toothed or rarely entire; lower lip entire or 3-toothed. Wings united at the summit; keel falcate, acuminate. Stamens monadelphous; alternate filaments longer. Stigma bearded. Pod coriaceous, somewhat oblong, somewhat flattish, often torulose or with cross partitions. (*L. lupus*=a wolf; it was supposed to devour that which made the soil fertile.)

A. Ovary 1—2-ovuled; pod 1—2-seeded, ovate; annual. PLATYCARPOS (p. 226)

AA. Ovary 3—15-ovuled; pod mostly more than 2-seeded, usually longer than ovate for its width; annual or perennial. EULUPINUS (p. 226)

Subgenus PLATYCARPOS—Cotyledons persisting, wide and clasping.

A. Flowers in whorls on the axis of the raceme.

B. Hairs short, appressed, silky; petals yellow. U.

L. luteolus Kell.

BB. Hairs long, spreading, villous; petals purple or white or cream-colored. E.

L. microcarpus Sims.

AA. Flowers scattered on the axis of the raceme.

C. Leaflets mostly 5, 1.8—3 cm. long, acute or obtuse at apex. E.

L. pusillus Pursh

CC. Leaflets mostly 7, 1—1.5 cm. long, rounded at apex. E.

L. brevicaulis Wats.

Subgenus EULUPINUS—Cotyledons not persisting, petioled.

A. Annual.

GROUP 1 (p. 226)

AA. Perennial.

B. Upper surface of the leaflets glabrous or somewhat hairy but green, not silvery-hairy.

GROUP 2 (p. 227)

BB. Upper surface of the leaflets silvery-hairy.

C. Plants less than 3 dm. high.

GROUP 3 (p. 228)

CC. Plants more than 3 dm. high.

GROUP 4 (p. 229)

GROUP 1

A. Plant 3—6 dm. high; bracts mostly exceeding the calyx; lower lip of the calyx entire. W.

L. carnosulus Gr.

AA. Plant 2.5 dm. or less high; bracts shorter than the calyx.

- B. Lower lip of the calyx entire; pedicels 2 mm. or less long. W.
L. micranthus Dougl.
 BB. Lower lip of the calyx slightly 3-cleft; pedicels about 4 mm. long. U.
L. bicolor Lindl.
 BBB. Lower lip of the calyx 3-parted; pedicels 2 mm. or less long. U.
L. trifidus Torr.

GROUP 2

- A. Plants less than 3 dm. high.
 B. Leaflets 3—4.2 cm. long, not mucronulate; keel of corolla not ciliate. W. C. E.
(L. arcticus.) L. subalpinus P. & R.
 BB. Leaflets either shorter or else mucronulate; keel of corolla distinctly ciliate.
 C. Petal 8—10 mm. long.
 D. Leaflets 8—12, 1.2—2.5 cm. long, not mucronulate; flowers in loose racemes. C. *L. volcanicus* Gr.
 DD. Leaflets 6—10, 2.5—5 cm. long, mucronulate; flowers in dense racemes.
 U. *L. mucronulatus* How.
 CC. Petals 15 mm. long. E.
L. saxosus How.
 AA. Plants more than 3 dm. high.
 E. Plant shrubby at base. U. *L. propinquus* Gr.
 EE. Plants not shrubby at base.
 F. Calyx spurred or saccate at base.
 G. Leaflets oblanceolate.
 H. Leaflets hairy above.
 I. Stem villous with spreading or retrorse hairs. E.
L. retrorsus Hend.
 II. Stem minutely pubescent with appressed hairs. E. (*L. laxiflorus montanus.*) *L. laxiflorus* Dougl.
 HH. Leaflets glabrous above or very nearly so.
 J. Leaflets 4—6; calyx spurred at base. E.
L. stenophyllus Rydb.
 JJ. Leaflets 7—10; calyx gibbous or saccate at base. E. (*L. laxispiciatus.*) *L. pseudoparviflorus* Rydb.
 GG. Leaflets linear to lanceolate.
 K. Calyx saccate or gibbous at base. E.
L. argenteus Pursh
 KK. Calyx with spur as long as its tube. E.
L. multitinctus Nels.
 FF. Calyx symmetric at base or nearly so.
 L. None of the petioles more than twice as long as the leaflets.
 M. Keel of the corolla ciliate. E.
L. parviflorus Nutt.
 MM. Keel of the corolla naked.
 N. Leaflets 10—16. (See Q.)
 NN. Leaflets 6—9.
 O. Lower calyx-lip entire. W.
L. latifolius Agh.
 OO. Lower calyx-lip 3-toothed. W.
L. nootkatensis Donn
 LL. Lower petioles more than twice as long as the leaflets.
 P. Keel of the corolla naked.

- Q. Leaflets 8—16, 5—15 cm. long; racemes 3—6 dm. long; bracts equaling or shorter than the calyx; upper calyx-lip 2-toothed. W.
L. polyphyllus Lindl. (Giant Lupine)
- QQ. Leaflets 8—12, 2.5—7.5 cm. long; racemes 1—2.5 dm. long; bracts exceeding the calyx; upper calyx-lip entire. E.
L. wyethii Wats.
- PP. Keel of the corolla ciliate for at least a part of its length.
- R. Leaflets loose-hairy on both sides, obtuse to rounded at apex. (See B.)
- RR. Leaflets glabrous on the upper side, acute or the lower ones obtuse.
- S. Stem simple. U. E. (*L. ligulatus*; *L. ligulatus barbatus*).
L. burkei Wats.
- SS. Stem branched.
- T. Plant somewhat pubescent with closely appressed hairs; petioles 1.2—12.5 cm. long; leaflets widest above the middle, not mucronulate. W. E. *L. rivularis* Dougl.
- TT. Plant glabrous or somewhat loose-hairy; petioles 30—45 cm. long; leaflets widest below their middle, mucronulate.
L. longipes Gr.

GROUP 3

- A. Standard hairy.
- B. Lower petioles more than twice as long as the leaflets. E.
L. erectus Hend.
- BB. None of the petioles more than twice as long as the leaflets. C. E. (*L. alpicola*).
L. flexuosus Lind.
- AA. Standard glabrous.
- C. Average leaflet over 25 mm. long.
- D. Leaflets 4—4.5 cm. long. E.
L. helleriae Hel.
- DD. Leaflets not over 3.6 cm. long.
- E. Pedicels 1—2 mm. long; pod 15 mm. long. W. E.
L. lepidus Dougl.
- EE. Pedicels 2.5—4 mm. long; pod 20—25 mm. long. E. (*L. piperi imberbis*).
L. piperi Rob.
- CC. Average leaflet between 12 and 25 mm. long.
- F. Lower calyx-lip minutely 2-toothed. E.
L. brachypodus Pip.
- FF. Lower calyx-lip 3-toothed.
- G. Stem 15—25 cm. high; 2—3-leaved; leaflets obtuse. E.
L. subsericeus Rob.
- GG. Stem leafless or only 1-leaved; leaflets acute (obtusish in *L. breweri*).
- H. Plants 20—40 cm. high; keel 9—11 mm. long. (See E.)
- HH. Plants 5—20 cm. high; keel 6—8 mm. long.
- I. Inflorescence-bracts exceeding the calyx. E.
L. caespitosus Nutt.
- II. Inflorescence-bracts not exceeding the calyx.
- J. Densely hairy with somewhat shaggy hairs; standard obovate-oblong. W. E. *L. aridus* L.
- JJ. Densely hairy with appressed straight hairs; standard nearly orbicular. E. (*L. lobbii*; *L. cusickii*).
L. minimus Dougl.

- CCC. Average leaflet less than 12 mm. long.
 K. Inflorescence-bracts exceeding the calyx; plant herbaceous at base; standard elliptic. (See F.)
 KK. Inflorescence-bracts shorter than the calyx; plant shrubby at base.
 L. Leaflets 5—6, acutish; peduncles exceeding the leaves; standard elliptic. C.
 L. lyallii Gray
 LL. Leaflets 7—10, obtusish; peduncles shorter than the leaves; standard orbicular. U. C. *L. breweri* Gray

GROUP 4

- A. Plants shrubby at base.
 B. Leaflets lanceolate. W. *L. holosericeus* Nutt.
 BB. Leaflets oblanceolate. E.
 L. subulatus Rydb.
 AA. Plants not shrubby at base.
 C. Calyx spurred at base. E. (*L. laxiflorus montanus.*)
 L. laxiflorus Dougl.
 CC. Calyx symmetric or very nearly so at base.
 D. Flowers yellow.
 E. Leaflets 8—11, widest above their middle; petals bright-yellow; keel ciliate.
 L. sabinii Dougl.
 EE. Leaflets 13—15, widest below their middle; petals light-yellow; keel glabrous. E. *L. sulphureus* Dougl.
 DD. Flowers not yellow.
 F. None of the petioles more than twice as long as the leaflets.
 G. Keel of the corolla ciliate.
 H. Standard glabrous. E.
 L. suksdorfii Rob.
 HH. Standard somewhat pubescent on the back.
 I. Pedicels of the flowers less than 4 mm. long. E. (*L. leucophyllus plumosus.*) *L. leucophyllus* Dougl.
 II. Pedicels of the flowers more than 4 mm. long.
 J. Flowers conspicuously 2-colored. E. (*L. ornatus bractosus.*)
 L. ornatus Dougl.
 JJ. Flowers not 2-colored or inconspicuously so. C. E. (*L. alpicola.*) *L. flexuosus* Lindl.
 GG. Keel of the corolla naked. W. E.
 L. albicaulis Dougl. (White-stemmed Lupine)
 FF. Lower petioles more than twice as long as the leaflets.
 K. On sand dunes along the seashore; stems prostrate or decumbent. W.
 L. littoralis Dougl. (Chinook Licorice)
 KK. Not a seashore plant; stems erect or nearly so.
 L. Upper petal (standard) naked.
 M. Pod 15 mm. long; pedicels 1—2 mm. long. W. E.
 L. lepidus Dougl.
 MM. Pod 20—25 mm. long; pedicels 2—4 mm. long. E. (*L. piperi imberbis.*) *L. piperi* Rob.
 LL. Upper petal (standard) hairy outside.
 N. Leaflets lanceolate. E. (*L. canescens amblyphyllus.*)
 L. canescens How.
 NN. Leaflets oblanceolate.

O. Upper lip of the calyx slightly 2-toothed. E.

L. sericeus Pursh

OO. Upper lip of the calyx cleft for $\frac{1}{2}$ — $\frac{2}{3}$ its length.

P. Plant 2—4 dm. high; not tomentose nor villous. E.

L. erectus Hend.

PP. Plant 6—9 dm. high; somewhat tomentose and villous. E.

(*L. leucophyllus plumosus*.)

L. leucophyllus Dougl.

MEDICAGO

MEDIC

Herbs (ours). Leaves small, 3-foliolate; stipules often incised; leaflets usually dentate, pinnately veined. Flowers small, yellow or violet, in axillary heads or spikes. Calyx-teeth short, nearly equal. Standard obovate or oblong; wings oblong; keel obtuse. Stamens diadelphous, 10, in groups of 1 and 9. Pod curved or spirally twisted, reticulate or spiny, indehiscent. Seeds 1 to few. (Gk. medike—the alfalfa; because the Greeks got this from Media.)

A. Perennial, 5—12 dm. high; flowers violet, in spikes about 6 cm. long. W. E.

M. sativa L. (Alfalfa)

AA. Annual, 1.5—6 dm. high; flowers yellow, in heads about 2 cm. long.

B. Pod several-seeded, spiral, spiny on the edges. W. E.

M. denticulata Willd. (Bar Clover)

BB. Pod 1-seeded, curved, not spiny. W. E.

M. lupulina L. (None-such)

MELILOTUS

MELILOT

Herbs, annual or biennial. Leaves petioled, 3-foliolate; leaflets dentate. Flowers small, white or yellow, in slender racemes. Calyx-teeth short, nearly equal. Standard obovate or oblong; wings oblong; keel obtuse. Stamens diadelphous, in groups of 9 and 1. Pod ovoid or globose, straight, indehiscent or finally 2-valved. Seeds 1—few. (Gk. meli=honey, lotos=some plant of this family; the flowers are prolific in honey.)

A. Flowers white. E. *M. alba* Desv. (Sweet Clover)

AA. Flowers yellow.

B. Leaflets obtuse, toothed from near the base; petals 6—9 mm. long. E.

M. officinalis Lam. (Yellow Melilot)

BB. Leaflets truncate or emarginate, toothed above the middle; petals 2—2.5 mm. long. E.

M. indica All. (Small Melilot)

TRIFOLIUM

CLOVER

Herbs. Leaves normally 3-foliolate, in a few species 5—7-foliolate; leaflets denticulate; stipules adnate to the petiole. Flowers purple or red or pink or white or yellow, in dense heads or spikes. Calyx-teeth nearly equal. Petal-claws adhering to the stamen-tube. Stamens diadelphous in groups of 9 and 1, or monadelphous by only the partial separation of the 1. Pod oblong or terete, often enclosed in the calyx, membraneous, indehiscent or at last dehiscent by 1 suture. Seeds 1—6. (L. tres=3, folium=leaf.)

A. Leaflets 3—7 but always some leaves with 5—7; heads without involucre.

B. Leaflets 5—7; flowers 2—3 cm. long. E. (*T. megacephalum*.)

T. macrocephalum Poir. (Long-flowered Clover)

BB. Leaflets 3—5; flowers 6—8 mm. long. E.

T. plummerae Wats.

- AA. Leaflets 3 except in occasional abnormal leaves.
- C. Heads not subtended by an involucre.
- D. Heads on terminal peduncles; plants sometimes stemless.
- E. Leaves glabrous.
- F. Calyx-teeth 3 times as long as the tube. E. (*T. altissimum*)
T. douglasii House
- FF. Calyx-teeth scarcely longer than the tube.
- G. Stem quite evident.
- H. Stem stout; heads globose; leaflets mostly obtuse; flowers 12—20 mm. long. E. (*T. aitonii*)
T. beckwithii Brew.
- HH. Stem slender; heads oblong; leaflets mostly acuminate; flowers 8—14 mm. long. (See P.)
- GG. Stemless or nearly so. E.
T. haydeni Port.
- EE. Leaves pubescent.
- I. Corolla pink or red or purple.
- J. Perennial; calyx-lobes not plumose, shorter than the corolla.
- K. Stems 3—9 dm. high; leaflets 2.5—5 cm. long; flowers purplish-red, not reflexed; stipules acuminate. W. C. E.
T. pratense L. (Red Clover)
- KK. Stems 1.5—2 dm. high; leaflets 1.2—2.5 cm. long; flowers pinkish or light-red, at length reflexed; stipules acute. U.
T. oreganum How.
- JJ. Annual; calyx-lobes plumose, equaling or exceeding the corolla.
- L. Leaflets 4—12 mm. long; heads ovate; flowers dark-purple. W.
T. albopurpureum T. & G.
- LL. Leaflets 12—25 mm. long; heads oblong; flowers pinkish. W. E.
T. arvense L. (Rabbit-foot Clover)
- II. Corolla yellow or white.
- M. Heads ovoid or oblong; flowers at length reflexed. E. (Apparently *T. harneyensis*)
T. plumosum Dougl.
- MM. Heads obovate. W. C. E.
T. longipes Nutt.
- MMM. Heads globose.
- N. Calyx-teeth plumose.
- O. Lobes of the calyx about equal, 3—4 times as long as the calyx-tube. W. *T. eriocephalum* Nutt.
- OO. Lobes of the calyx unequal, one twice as long as the other and as the calyx-tube. E. (*T. arcuatum cusickii*)
T. arcuatum Pip.
- NN. Calyx-teeth hairy but not plumose.
- P. Flowers with pedicels. C. E. (*T. longipes latifolium*; *T. kingii*.) *T. latifolium* Gr.
- PP. Flowers nearly sessile. E.
T. covillei House
- DD. Heads on axillary peduncles; plants not stemless.
- Q. Flowers yellow.
- R. Heads 3—15-flowered; standard faintly striate. W. C.
T. dubium Sibth. (Small Hop-clover)

- RR. Heads 20—40-flowered; standard distinctly striate. W.
T. procumbens L. (Large Hop-clover)
- QQ. Flowers white or pinkish.
- S. Calyx and its lobes $1/3$ shorter than the corolla; perennials.
- T. Leaflets 0.6—2.5 cm. long; heads ovate or oblong, many-flowered.
 U. *T. howellii* Wats.
- TT. Leaflets 0.6—1.2 cm. long; heads 5—10-flowered.
 U. Stipules oval. E.
T. gymnocarpon Nutt.
- UU. Stipules lanceolate. U.
T. depauperatum Desv.
- TTT. Leaflets 2.5—7.5 cm. long; heads globose, many-flowered.
- V. Leaflets obtuse, rarely emarginate; erect or ascending, not stoloniferous; stem not rooting at the joints; flowers pinkish; calyx-teeth about equal. W. E. *T. hybridum* L. (Alsike Clover)
- VV. Leaflets obcordate to retuse; prostrate with the tip ascending, stoloniferous; stem rooting at the joints; flowers white; calyx-teeth very unequal. W. C. E.
T. repens L. (White Clover)
- VVV. Leaflets mostly retuse; prostrate; flowers white or pinkish; calyx-teeth about equal. U.
T. breweri Wats.
- SS. Calyx-lobes from almost equaling to exceeding the corolla; annuals.
- W. Calyx-teeth scarious-margined, ciliate. W. E.
T. ciliolatum Benth.
- WW. Calyx-teeth not scarious-margined, not ciliate.
- X. Leaflets notched at apex. W. E.
T. hallii How.
- XX. Leaflets not notched at apex. W.
T. gracilentum T. & G.
- CC. Heads subtended by an involucre.
- Y. Corolla yellow; standard conspicuously enlarged. W.
T. flavulum Gr.
- YY. Corolla ochroleucous; standard conspicuously enlarged. W.
T. furcatum Lindl.
- YYY. Corolla not yellow nor ochroleucous; standard not conspicuously enlarged except in *T. depauperatum*).
- Z. Involucre membranous at least at base, not deeply lobed, the lobes entire or toothed; flowers white or light pink.
- a. Plant glabrous.
- b. Involucre none or entire with entire segments; leaflets 6—12 mm. long; standard much enlarged; calyx-teeth not branched. U.
T. depauperatum Desv.
- bb. Involucre with 7—10 shallow lobes, the lobes spinulose-dentate; leaflets 12—25 mm. long; standard not much enlarged; calyx-teeth branched. E. *T. cyathiferum* Lindl.
- aa. Plant villous; calyx-teeth scarious-margined.
- c. Involucre merely basal, its lobes laciniately toothed; calyx glabrous. W. C. *T. microdon* H. & A.
- cc. Involucre nearly enclosing the head, its lobes entire; calyx hairy. W. E. *T. microcephalum* Pursh

ZZ. Involucre not membranous, deeply lobed, the lobes laciniately and sharply toothed; flowers dark lilac-purple.

d. Plant perennial with creeping rhizomes. W. E. (*T. spinulosum*; *T. heterodon*.) *T. fimbriatum* Lindl.

dd. Plant annual.

e. Leaflets obovate or obcordate, 0.6—1.2 cm. long; heads 1—1.4 cm. wide. W. C. E. *T. variegatum* Nutt.

ee. Leaflets linear or oblong or lanceolate.

f. Leaflets 1.6—2 cm. long, obtuse or emarginate; heads 5—7-flowered, 1—1.5 cm. wide; calyx-lobes never 3-toothed. W.

T. oliganthum Steud.

ff. Leaflets 2.5—5 cm. long, obtuse or acute; heads more than 7-flowered, 2—3 cm. wide; calyx-lobes sometimes 3-toothed. W. (*T. obtusiflorum*.) *T. tridentatum* Lindl.

LOTUS (Hosackia)

BIRD-FOOT TREFOIL

Herbs, annual or perennial. Leaves 1- to several-foliolate (ours 3—15), ternate or pinnate; leaflets entire. Flowers 1 to several in a leaf-axil, often in umbels; peduncle none or naked or with 1—5-foliolate bracts near the flower-cluster. Calyx 5-toothed or -cleft; teeth nearly equal. Petals free from the stamens, nearly equal; standard ovate or roundish; wings obovate or oblong; keel somewhat incurved, obtusely or acutely beaked. Stamens diadelphous, in groups of 9 and 1. Pods linear, flattish or terete, straight or arcuate, dehiscent or indehiscent, with spongy partition between the seeds. Seeds 1 to several. (A Greek name for some plants of this family.)

A. Annual; flowers solitary (sometimes 2 on a peduncle in *L. parviflora*).

B. Flowers and pods nearly sessile.

C. Stem glabrous, 3—6 dm. high, erect, sparingly branched; corolla pale yellow to dark red. W. E. *L. denticulatus* Greene

CC. Stem pilose or villous, 1—1.5 dm. high, diffusely branched from the base, corolla bright yellow. U. (*L. humistratus*.)

L. wrangelianus F. & M.

BB. Flowers and pods with peduncles nearly as long as the leaves or longer.

D. Leaflets lanceolate to ovate, usually villous; flowers 5—6 mm. long; bract at top of peduncle 1—3-foliolate. W. E. (*L. micranthus*.)

L. americanus Bisch. (Spanish Clover)

DD. Leaflets oblong to ovate, usually glabrous; flowers 3—4 mm. long; bract at top of peduncle 1—3-foliolate. E. (*L. micranthus*.)

L. parviflorus (Benth.)

AA. Perennial; flowers in umbels.

E. Leaflets 3—9; flowers various but with some yellow in them.

F. Leaves pubescent; flowers 4—13 mm. long.

G. Stem procumbent or ascending, villous or tomentose; leaflets mostly acute, 6—12 mm. long; pod 1—2-seeded, its beak not hooked. W. E. (*L. Douglasii*.) *L. decumbens* (Benth.)

GG. Stems erect or ascending, finely pubescent; leaflets mostly obtuse, 13—25 mm. long; pod 5 or more seeded, its beak hooked. U.

L. torreyi Gr.

FF. Leaves glabrous or nearly so; flowers 14—20 mm. long.

H. Flowers pure-yellow. E.

L. macbridei Nels.

HH. Flowers with yellow standard but white or purple wings.

- I. Peduncles usually without a bract; corolla with yellow standard and white wings. W. E. (*L. pinnatus*.)
L. bicolor (Dougl.)
- II. Peduncles with a bract at the umbel; corolla with yellow standard and purple wings. W. (*L. formosissimus*.)
L. gracilis (Benth.)
- EE. Leaflets 9—15; flowers purple. W. E.
L. crassifolius Gr.

PSORALEA

PSORALEA

Herbs (ours) or shrubs, perennial. Leaves 1—7-foliolate (ours 3—7), punctate with dark glands or pellucid dots; stipules wide. Flowers blue or pink or white, usually in spikes or racemes. Standard ovate or orbicular, clawed; wings oblong to falcate; keel uncurved, obtuse. Stamens monadelphous or diadelphous. Ovule 1. Pod ovoid, short, indehiscent. Seed 1. (Gk. psoraleos=scurfy; referring to the glands or dots on the leaves.)

- A. Leaflets broadly ovate; seed grayish. W. E. (*P. melilotoides* for our region.)
P. physodes Dougl.
- AA. Leaflets lanceolate; seed light brown. E. (*P. lanceolata scabra*; *P. purshii*.)
P. lanceolata Pursh

PETALOSTEMUM (Petalostemon, Kuhnistera) PRAIRIE CLOVER

Herbs, mostly perennial (so ours), glandular-dotted. Leaves odd-pinnate, leaflets 5—9 (ours); stipules setaceous, minute. Flowers bright purple, in spikes (ours) or heads; these dense, terminal, peduncled. Calyx 5-toothed; teeth somewhat united, nearly equal. Petals 5, on filiform claws; 4 of them nearly similar, their filiform claws united with the stamen-tube quite to the summit where they drop off by a joint; standard free, inserted at the bottom of the calyx, its limb cordate or oblong. Stamens 5, monadelphous; the tube cleft. Ovary with 2 ovules side by side. Pod membranous, enclosed in the calyx, indehiscent. Seed 1. (Gk. petalon=petal, stemon=stamen; from the union of the two in the flower.) E. *P. ornatus* Dougl.

ROBINIA

LOCUST

Trees (ours) or shrubs. Leaves odd-pinnate; stipules small, often spiny. Flowers white (ours), in axillary or terminal racemes. Calyx-teeth short, wide, the upper 2 somewhat united. Standard large, reflexed; wings oblong, curved; keel obtuse, curved. Stamens diadelphous. Ovary stalked; ovules many. Pod flat, linear, 2-valved, in ours 1—2 dm. long. (Honor of J. and V. Robin, who first cultivated the tree in Europe.) W. E.

R. pseudacacia L.

ASTRAGALUS (Phaca)

RATTLE-WEED

Herbs, erect to prostrate. Leaves odd-pinnate; leaflets entire; tendrils none; stipules persistent. Flowers in spikes or racemes, rarely solitary, small, narrow. Calyx 5-toothed. Petals with slender claws; keel obtuse. Stamens diadelphous. Stigma terminal, minute. Pod quite various, usually turgid or inflated but sometimes flat or angular, one or both sutures often projecting inward somewhat and sometimes dividing the pod into 2 cells. Seeds 1—many. (The Greek name of some plant of this family.)

- A. Pod membranous, thin, often inflated.

GROUP 1 (p. 235)

- AA. Pod chartaceous or coriaceous, tough or leathery, not inflated.
 B. Herbage long-hairy or woolly; pod often long-hairy or woolly.

GROUP 2 (p. 235)

- BB. Herbage and pod glabrous or short-pubescent.

- C. Pod with a stipe as long or longer than the calyx-tube.

GROUP 3 (p. 236)

- CC. Pod sessile or nearly so.

GROUP 4 (p. 237)

GROUP 1

- A. Pod 2-celled, the 2 sutures intruded and meeting. E. (*A. diaphanus*.) *Scaphium*
 A. lentiginosus Dougl.

- AA. Pod 1-celled, the sutures not meeting if intruded.

- B. Leaflets 13—19, linear to oblong, pod mottled.

- C. Peduncles not exceeding the leaves; calyx-teeth subulate; pod 3—5 cm. long, obovoid, obtuse. W. C. E. (*A. olympicus*.)

A. hookerianus Gray

- CC. Peduncles exceeding the leaves; calyx-teeth triangular; pod 1.5—2.5 cm. long, oblong, with short acute beak. E.

A. cusickii Gray

- BB. Leaflets 7—15 or fewer, linear or subulate when more than eleven.

- D. Leaflets cuneate-oblong to obovate, widest above their middle, obtuse or retuse.

- E. Leaflets cuneate-oblong, 6—8 mm. long; pod 6—12 mm. long. E.

A. suksdorfii How.

- EE. Leaflets obovate, 2—6 mm. long; pod 12—20 mm. long. E.

A. diurnus Wats.

- DD. Leaflets subulate to oblong or lanceolate, widest at or below their middle, often sharp pointed.

- F. Leaflets spinulose-tipped.

- G. Flowers purple; herbage sparsely hirsute. E.

A. aculeata Nels.

- GG. Flowers ochroleucous, or tinged with violet; herbage somewhat hoary-pubescent. E. *A. viridis* Sheld. (Prickly Rattle-weed)

- FF. Leaflets not spinulose-tipped.

- H. Pod mottled, ovoid; corolla pale rose-color; perennial. E.

A. ceramicus Sheld.

- HH. Pod not mottled, ovate-lunate; corolla ochroleucous; annual. E.

A. geyeri Gray

- HHH. Pod not mottled, 8—10 mm. long, oblong-linear; corolla ochroleucous or reddish; perennial. E.

A. diversifolia Gray

GROUP 2

- A. Pod hairy.

- B. Pod 2-celled; leaflets 11—25.

- C. Pod ovate, not curved, 4—8 mm. long, 2—4-seeded.

- D. Spike dense; flowers 10 mm. long; peduncles exceeding the leaves. E.

A. spaldingii Gray

- DD. Spike loose; flowers 6 mm. long; peduncles not exceeding the leaves. E.

A. lyallii Gray

- CC. Pod lanceolate, curved, 20—30 mm. long, many-seeded. E.

A. malacus Gray

- BB. Pod 1-celled; leaflets sometimes fewer than 11.

- E. Corolla yellow or ochroleucous but sometimes purplish at tip.

- F. Herbage hirsute; peduncles $\frac{1}{2}$ as long as the leaves; calyx-teeth $\frac{1}{5}$ as long as its tube. E. *A. purshii* Dougl.
- FF. Herbage woolly-pubescent; peduncle as long as the leaves; calyx-teeth $\frac{1}{2}$ as long as its tube. E. *A. leucocystis* Gr.
- EE. Corolla purple or violet or greenish.
- G. Calyx-teeth as long as the calyx-tube; leaflets 21—25. E.
A. inflexus Dougl.
- GG. Calyx-teeth $\frac{1}{2}$ as long as the calyx-tube; leaflets 11—17. E.
A. utahensis T. & G.
- GGG. Calyx-teeth $\frac{1}{3}$ as long as the calyx-tube; leaflets 13—21.
- H. Hairs incumbent and appressed; pod glabrate at maturity. E. (*A. allanaris*.) *A. glareosus* Dougl.
- HH. Hairs loose and tangled; pod shaggy-pubescent at maturity. E.
A. booneanus Nels.
- AA. Pod glabrous.
- I. Stems erect or ascending; leaflets 13—20 mm. long; racemes few-flowered; pod 1.5—2.5 cm. long. U.
A. pacificus Sheld.
- II. Stems decumbent; leaflets 12 mm. or less long; racemes many-flowered; pod 5 cm. long. E. (*A. dorynioides*.)
A. succumbens Dougl.

GROUP 3

- A. Pod curved or coiled; calyx oblique.
- B. Leaflets 12—17 mm. long; calyx 10—13 mm. long. E.
A. gibbsii Kell.
- BB. Leaflets 2—12 mm. long; calyx 6—8 mm. long.
- C. Pod coiled. E. *A. speirocarpus* Gray
- CC. Pod merely curved, not coiled.
- D. Stipe of the pod much exceeding the calyx. E.
A. speirocarpus falciformis Gray
- DD. Stipe of the pod about equaling the calyx. E. (*A. whitedii*.)
A. sinuatus Pip.
- AA. Pod straight or nearly so; calyx usually not oblique.
- E. Both sutures of the pod intruded. U.
A. accidens Wats.
- EE. Only the dorsal sutures of the pod intruded; pod 1—2-celled.
- F. Leaflets 7—11, 1—3 mm. long. U.
A. catalinensis Nutt.
- FF. Leaflets 11—31, 4 or more mm. long.
- G. Pod compressed on its sutured sides.
- H. Leaflets broadly oval, glabrous. E.
A. beckwithii T. & G.
- HH. Leaflets oblong to lanceolate, hairy at least beneath. E. (*P. arrecta leibergii*; *A. palousensis*; probably *A. boiseanus*.)
A. arrectus Gray
- GG. Pod compressed on its unsutured sides or not at all.
- I. Stems 0.5—1.5 dm. high.
- J. Leaflets 4—6 mm. long, oblong to linear; pod reflexed. E.
A. misellus Wats.
- JJ. Leaflets 6—12 mm. long, oval to elliptic; pod pendent. E.
A. alpinus L. (Alpine Rattle-weed)

- II. Stems 3—6 dm. high; flowers white or yellow.
 K. Stems sparsely leafy; leaflets oblong to linear, pubescent above; flowers white; pod canescent. E.
 A. howellii Gray
 KK. Stems very leafy; leaflets oblong to oval, glabrous above; flowers yellowish; pod glabrous. E.
 A. racemosus Pursh
 EEE. Neither of the sutures of the pod intruded; pod 1-celled.
 L. Pod 0.8—1.7 cm. long, pubescent.
 M. Leaflets 11—19, 8—12 mm. long; flowers yellowish, pendent. E.
 A. californicus Gr.
 MM. Leaflets 19—23, 12—25 mm. long; flowers whitish, reflexed. E.
 (*A. cyrtoides*.) *A. collinus* Dougl.
 LL. Pod 2.3—5 cm. long, glabrous.
 N. Peduncles not exceeding the leaves; pod flat. E. (*A. multiflorus*.)
 A. tenellus Pursh
 NN. Peduncles much exceeding the leaves.
 O. Calyx white-pubescent; stipules subulate, 4—6 mm. long, acuminate; pod 12—17 mm. long, turgid. E.
 A. tweedyi Canby
 OO. Calyx black-pubescent; stipules triangular, 2 mm. long, acute; pod 19—31 mm. long, flat. E. (*A. filipes*.)
 A. stenophyllus T. & G.

GROUP 4

- A. Pod 2-celled or very nearly so by the intrusion of one or both sutures.
 B. Both sutures of the pod intruded; flowers purplish.
 C. Plant glabrous thruout; leaflets obcordate to orbicular; pod 12—20 mm. long. E.
 A. araneosus Sheld.
 CC. Plant somewhat hairy; leaflets obovate to oblong; pod 8—12 mm. long.
 E. (*A. diaphanus*.) *A. lentiginosus* Dougl.
 BB. Only the dorsal sutures of the pod intruded; flowers various in color, often purplish.
 D. Pod ovoid to ovate-oblong, less than 3 times as long as wide.
 E. Petals yellowish; leaflets obovate to oblong; pod glabrous. E.
 A. salinus How.
 EE. Petals purplish; leaflets various in form; pod hairy.
 F. Calyx-teeth $\frac{1}{2}$ as long as the calyx-tube; leaflets oblong or narrower; spike oblong; stem rather stout. E. (*A. adsurgens*.)
 A. nitidus Pursh
 FF. Calyx-teeth about equaling the calyx-tube; leaflets oblong or wider; spike head-like; stem weak. E. (*A. hypoglottis* for our region.)
 A. agrestis Dougl.
 DD. Pod narrower, more than 4 times as long as wide.
 G. Herbage glabrous; leaflets 17—21, oblong, retuse. U.
 A. umbraticus Sheld.
 GG. Herbage not glabrous; leaflets 5—17, either not oblong or not retuse.
 H. Leaflets obovate, usually emarginate; calyx-teeth about equaling the calyx-tube; pod quite sickle-shaped. E.
 A. drepanolobus Gray
 HH. Leaflets oblong to linear, obtuse to acute; calyx-teeth distinctly shorter than the calyx-tube; pod nearly straight.

- I. Stems 1.5—3 dm. high; leaflets 4—10 mm. long; raceme loose. E.
A. obscurus Wats.
- II. Stems 4.5—6 dm. high; leaflets 12—25 mm. long; raceme dense. E.
A. mortoni Nutt.
- AA. Pod 1-celled altho one or both sutures may be somewhat intruded.
- J. Leaflets rigid, prickly-pointed; flowers 1—3, nearly sessile in the leaf-axils. E.
A. viridis Sheld. (Prickly Rattle-weed)
- JJ. Leaflets not rigid, not prickly pointed; flowers often more numerous, in spikes or racemes.
- K. Only the dorsal suture of the pod intruded. E.
A. iodanthus Wats.
- KK. Only the ventral suture of the pod intruded. E.
A. cibarus Sheld.
- KKK. Neither suture of the pod intruded.
- L. Pod linear.
- M. Plant white- or silky-pubescent; leaflets lanceolate or linear or oblanceolate; keel of the corolla with long inflexed beak. E. (*A. convallarius*.)
A. campestris Gray
- MM. Plant not white- nor silky-pubescent altho usually hairy; leaflets linear.
- N. Plant 1—2 dm. high; leaflets 7—13, linear or lanceolate; calyx-teeth about as long as the calyx-tube. E.
A. decumbens Gray
- NN. Plant 2—4 dm. high; leaflets 9—21, linear to oblanceolate; calyx-teeth about $\frac{1}{3}$ as long as the calyx-tube. E.
A. serotina Gray
- LL. Pod wider than linear.
- O. Pod chartaceous.
- P. Leaflets 2—4 mm. long, lanceolate, 11—13. E.
A. bourgovii Gray
- PP. Leaflets 4—8 mm. long, linear or oblong, 7—13.
- Q. Stems 5—15 cm. high; leaflets linear, acute; peduncles about equaling the leaves, 1—3-flowered. E.
A. tegetarius Wats.
- QQ. Stems 20—25 cm. high; leaflets broadly linear to oblong, obtuse; peduncles much exceeding the leaves, 5—7-flowered. E. (*A. microcystis*.) *A. miser* Dougl.
- OO. Pod coriaceous.
- R. Leaflets 3—11.
- S. Corolla yellow; peduncles exceeding the leaves; calyx-teeth nearly equaling the calyx-tube. E.
A. flavovirens Sheld.
- SS. Corolla light violet; peduncles shorter than the leaves; calyx-teeth much shorter than the calyx-tube. E.
A. chamaeleuce Gray
- RR. Leaflets 11—21.
- T. Pod ovoid, about 1 cm. long; peduncle much exceeding the leaves; leaflets oblong to obovate. E.
A. adanus Nels.
- TT. Pod narrowly oblong, about 2 cm. long; peduncle hardly exceeding the leaves; leaflets linear. E.
A. conjunctus Wats.

RRR. Leaflets 21—29.

U. Stipules lanceolate; calyx black-hairy; calyx-teeth not over $\frac{1}{2}$ as long as the calyx-tube; pod glabrous. E. (*P. raventa canbyi*.)

A. reventus Gray

UU. Stipules subulate; calyx white-hairy; calyx-teeth almost as long as the calyx-tube; pod pubescent. E.

A. hoodianus How.

ARAGALLUS (Oxytropis)

LOCO-WEED

Herbs, perennial, rarely annual, often stemless. Leaves odd-pinnate; leaflets entire. Flowers various in color, in spikes or heads; flower-clusters axillary or basal, peduncled. Calyx 5-toothed. Keel with subulate point or acute or appendaged. Pod partly 2-celled by the intrusion of the ventral (placental) suture. (Origin?)

A. Calyx somewhat bladdery-inflated. E.

A. blankinshipii Nels.

AA. Calyx not inflated.

B. Pod bladdery-inflated, membranous. E. (*Astragalus sclerocarpus*; *Phaca podocarpa*.)

A. podocarpus Nels.

BB. Pod not bladdery-inflated, often turgid or coriaceous.

C. Plants somewhat glandular-viscid; leaflets 25—55. E.

A. viscidus Gr.

CC. Plants neither glandular nor viscid; leaflets fewer in most species.

D. Pod nearly 2-celled by the intrusion of a suture; stems pubescent but not silky.

E. Leaves sparsely pubescent; corolla ochroleucous or yellow, without purple spot on the keel. E.

A. gracilis Nels.

EE. Leaves silky-pubescent; corolla ochroleucous with a purple spot on the keel, or with more purple. E.

A. dispar Nels.

DD. Pod not over half 2-celled by the intrusion of a suture to the middle or less; stems silky-canescens. W. C. E.

A. monticola Gr.

GLYCYRRHIZA

LICORICE

Herbs, perennial; roots thick, sweet. Leaves odd-pinnate; stipules deciduous. Flowers in spikes or heads; the clusters dense, axillary, peduncled. Calyx-teeth 5, nearly equal; calyx-tube gibbous at base. Standard narrowly ovate or oblong, short-clawed; wings oblong, acutish; keel acute or obtuse, shorter than the wings. Stamens usually diadelphous. Pod sessile, covered with prickles or glands, nearly indehiscent, ovate or oblong, flattish. (Gk. glykys=sweet, rhiza=root; the root is sweet.) E. (*G. glutinosa*; *G. lepidota glutinosa*.) G. lepidota Nutt. (Wild Licorice)

HEDYSARUM

Herbs. Leaves odd-pinnate; leaflets entire, usually pellucid-punctate; stipules scarious. Flowers white or yellow, in racemes; racemes axillary, peduncled, bracted; bracts scarious or setaceous. Calyx 5-toothed or -parted; segments linear-subulate, nearly equal. Corolla free from the stamens; standard rather large; keel oblique, truncate, longer than the wings. Stamens diadelphous. Pod flat, transversely jointed; joints roundish, 1-seeded,

indehiscent, connected in the middle. (Gk. *hedys*=sweet, *aroma*=smell; apparently from the fragrant flowers of some.)

A. Flowers cream-colored. E. (*H. flavescens*.)

H. sulphurescens Rydb.

AA. Flowers light purple.

B. Stems and leaves canescent. E.

H. cinerascens Rydb.

BB. Stems and leaves green, glabrate or nearly so. W. E. (*H. mackenzii*; *H. uintahensis*; *H. occidentalis*.) *H. boreale* Nutt.

VICIA

VETCH

Herbaceous, viney, climbing or trailing or quite weak. Leaves pinnate, tendrill-bearing; stipules half-sagittate or entire. Flowers axillary, solitary or in racemes. Calyx-tube oblique; calyx-teeth about equal or the 2 upper ones slightly longer. Corolla blue or violet or white or yellow; standard obovate or oblong, emarginate, clawed; wings obliquely oblong, adherent to the keel; keel shorter than the wings, oblong, curved. Stamens diadelphous in groups of 9 and 1, or monadelphous below. Ovules several to many; style very slender with a tuft or ring of hairs at its summit. Pod flat, dehiscent, 2-valved. (Gk. *bikion* and *L. vicia*=the names of these plants.)

A. Flowers in spikes or racemes on axillary peduncles.

B. Leaflets 20—30, 2.5—5 cm. long; flowers ochroleucous or tawny; perennial.

W. C. E. (*V. semicincta*.) *V. gigantia* Hook. (Giant Vetch)

BB. Leaflets either fewer or less than 2.5 cm. long; flowers from white to purple.

C. Flowers bluish-white, 4 mm. or less long; peduncles 2—6-flowered; plant annual; leaflets 12—14; pod hairy. W.

V. hirsuta Koch. (Hairy Vetch)

CC. Flowers deep blue, 5—18 mm. long; plant perennial.

D. Leaflets 18—24; peduncles densely 15—40-flowered; pod glabrous. W.

V. cracca L. (Tufted Vetch)

DD. Leaflets 8—16; peduncles loosely 5—16-flowered.

E. Plant glabrous or not villous if hairy, 3—12 dm. high; pod glabrous; leaflets 12—25 mm. long.

F. Leaves ovate-lanceolate to broadly oval. W. C. E. (*V. truncata*; *V. americana truncata*; *V. americana oregana*.)

V. americana Muhl. (Common Vetch)

FF. Leaves narrowly linear to oblong. W. C. E. (*V. americana linearis*.) *V. linearis* Gr. (Narrow-leaved Vetch)

EE. Plant villous-pubescent; 1.5—3 dm. high; pod pubescent; leaflets 4—14 mm. long. W. C.

V. californica Gr.

AA. Flowers solitary or in 2's in the axils of the leaves, nearly sessile; annuals.

G. Leaflets 6—8, oblong to linear; flowers white or purplish, 6 mm. long; pod 1.6—2.5 cm. long. U. C. *V. exigua* Nutt.

GG. Leaflets 8—16; flowers purple, 12—25 mm. long; pod 2.5—7.5 cm. long.

H. Leaflets oblong to ovate; pod brown; flowers 18—25 mm. long. W. C.

V. sativa L. (Spring Vetch)

HH. Leaflets linear to linear-oblong; pod black; flower 12—16 mm. long. W.

V. angustifolia Roth. (Common Vetch)

LATHYRUS

PEA

Herbs, erect to vining. Leaves pinnate, mostly with tendrils. Flowers solitary or in racemes. Calyx oblique or gibbous at base; calyx-teeth nearly equal or the upper ones somewhat shorter than the lower. Corolla as in *Vicia* but usually larger. Stamens diadelphous in groups of 9 and 1, or monadelphous below. Ovules generally numerous; style curved; flattish, hairy along its inner side. Pod flat or sometimes terete, 2-valved, dehiscent. (Gk. lathyros—the name of some plant of this family.)

A. Plant densely silky-villous; rachis of leaves without tendrils. W.

L. littoralis Endl. (Shaggy Pea)

AA. Plant not villous, either glabrous or pubescent; rachis of leaves mostly with tendrils or their rudiments.

B. Flowers purple or whitish.

C. Stipules narrow, half-sagittate, their lobes usually lanceolate, acuminate; plants glabrous or pubescent.

D. Leaflets 6—14 mm. long, pubescent.

E. Peduncles 1—2-flowered; stem very slender. W.

L. torreyi Gray (1-flowered Pea)

EE. Peduncles 4—6-flowered; stem rigid. W.

L. vestitus Nutt.

DD. Leaflets 15—25 mm. or more long, glabrous or hairy.

F. Leaflets 2—4, 2.5—8.7 cm. long; peduncles 2-flowered; flowers purplish. E. (*L. sandbergii*; *L. bijugatus sandbergii*.)

L. bijugatus White

FF. Leaflets 4—6 or more, often shorter; either peduncles with 3 or more flowers or else flowers white.

G. Flowers white.

H. Leaflets 1.4—2 cm. long. E.

L. rigidus White

HH. Leaflets 2.5—7.5 cm. long.

I. Leaflets linear to linear-lanceolate. E.

L. cusickii Wats.

II. Leaflets ovate to ovate-oblong. E. (*L. obovatus stipulaceus*; *L. nevadensis*.)

L. obovatus White

GG. Flowers purple.

J. Stem wingless altho sometimes angular.

K. Flowers 25 mm. or more long, 3—5 on a peduncle. E.

L. decaphyllus Pursh (Prairie Pea)

KK. Flowers 10—20 mm. long, often more than 5 on a peduncle.

L. Plant glabrous thruout or merely minutely papillose.

M. Peduncles about equaling the leaves; leaves not thick nor coriaceous. U.

L. bolanderi Wats.

MM. Peduncles much shorter than the leaves; leaves thick-coriaceous. W. E.

L. coriaceus White

LL. Plant pubescent.

N. Leaflets lanceolate, pubescent on both sides, obtuse. E.

L. oregonensis White

- NN. Leaflets oblong to ovate, pubescent beneath, glabrous above, acute. W. C. E. (*L. lanceolatus*).
L. nuttallii Wats.
- JJ. Stem winged. W. E.
L. palustris L. (Marsh Pea)
- CC. Stipules wide, ovate or somewhat half-hastate; their lobes wider than lanceolate, acute or acuminate; plant glabrous thruout.
- O. Leaflets 10—20, peduncles shorter than the leaves; leaflets not cuspidate; stipules acuminate. W. C.
L. polyphyllus Nutt. (Many-leaved Pea)
- OO. Leaflets 6—12.
- P. Leaflets elliptic to linear, cuspidate; stipules acuminate; peduncles exceeding the leaves. E. (*L. pauciflorus tenuior*; *L. parvifolius*).
L. pauciflorus Fer.
- PP. Leaflets ovate-oblong, not cuspidate; stipules acute; peduncles not exceeding the leaves. W.
L. maritimus Bigel. (Beach Pea)
- BB. Flowers ochroleucous. W. E. (*L. sulphureus*).
L. ochroleucus Hook. (Cream-colored Pea)

GERANIACEAE

Geranium Family

Herbs (ours) or shrubs. Leaves toothed or lobed or compound, alternate or opposite. Flowers perfect, regular or irregular, commonly symmetrical, on axillary peduncles. Sepals 5. Petals 5. Stamens mostly in 2 sets, those alternate with the petals sometimes sterile and in ours with a gland behind at base; filaments either dilated or monadelphous at base. Ovary superior, of 5 1-celled carpels united around a central axis; ovules 2 in each cell. Capsule 5-lobed; *carpels separating at maturity from the long-beaked central axis from below up; styles forming long carpel-tails which become revolute or spirally twisted.*

A. Leaves palmately-compound or -lobed or -veined.

GERANIUM (p. 242)

AA. Leaves pinnately-compound or -lobed or -veined.

ERODIUM (p. 243)

GERANIUM

GERANIUM

Annual or perennial. Leaves simple, alternate, palmately veined, petioled, usually lobed to deeply dissected; stipules conspicuous. Peduncles 1—3-flowered; pedicels with 4-bracted involucre at base. Sepals persistent. Stamens usually 10, sometimes 5, 5 longer and alternating with 5 shorter. Pistil 1; style 1; stigmas 5. Fruit a capsule, 5-lobed, each lobe separating at base at maturity and curling upward upon the style. Seed 1 in each cell. (Gk. *geranos*=a crane; referring to the crane-like beak of the pod.)

A. Annual; petals 1 cm. or less long.

B. Plants single or scarcely tufted. W. E. (*G. oreganum*; *G. incisum*.)

G. viscosissimum F. & M. (Sticky Geranium)

BB. Plants caespitose-tufted. E.

G. fremontii Torr.

AA. Perennial; petals 1.5—2 cm. long.

C. Sepals awn-pointed; seeds reticulate or pitted.

D. Flowers pale purple; seeds minutely reticulate. W. C. E. (*G. bicknellii*.)

G. carolinianum L.

DD. Flowers deep purple; seeds deeply pitted. W.

G. dissectum L. (Split-leaf Geranium)

CC. Sepals awnless; seeds smooth or striate.

E. Anther-bearing stamens 10; ovary glabrous, transversely rugose. W.
G. molle L. (Dove's-foot Geranium)

EE. Anther-bearing stamens 5; ovary pubescent, not rugose. W. E.
G. pusillum Burm. (Small Geranium)

ERODIUM

HERON'S-BILL

Leaves opposite or alternate, simple or compound; stipules present. Flowers in axillary umbels, nearly regular. Upper 2 petals slightly smaller. Anther-bearing stamens 5, alternate with 5 sterile filaments. Stigmas 5, ovules 2 in each cavity. Styles dehiscent, coiled spirally at maturity, villous-bearded on the inner side. Seed 1 in each lobe, not reticulate. (Gk. *erodios*=a heron; referring to the long beak of the pod.)

A. Leaves round-reniform to triangular-ovate, crenately dentate. U.

E. macrophyllum H. & A.

AA. Leaves pinnately compound or pinnatifid.

B. Leaflets unequally and doubly serrate; sepals 6—8 mm. long, not bristle-tipped; plant with a musk odor; anther-bearing filaments 2-toothed. U.

E. moschatum L'Her.

BB. Leaflets laciniately pinnatifid into narrow acute lobes; sepals 2—6 mm. long, bristle-tipped; plant without musk odor; filaments not toothed. W. E.

E. cicutarium L'Her.

OXALIDACEAE

Wood-sorrel Family

Herbs (ours) or shrubs, annual or perennial, often with rhizomes (so in ours) or scaly bulbs; *sap sour*. Leaves mostly with 3 leaflets (so in ours), in some (not ours) pinnate or entire and peltate; stipules usually present as scarious expansions of the petiole-base; leaflets usually obcordate (so in ours). Flowers perfect, in umbel-like or forked cymes, or sometimes solitary; peduncles mostly long. Sepals 5, often unequal. Petals 5, white or pink or purple or yellow. Stamens 10—15. Pistil 1; ovary superior, 5-celled, 5-lobed; styles united or distinct (ours); ovules 2 to many in each cell. Fruit a capsule (ours), rarely berry-like, loculicidal, globose or columnar.

OXALIS

WOOD-SORREL

Leaves alternate, basal or cauline. Flowers on axillary or basal peduncles, regular. Stamens 10, monadelphous at base, 5 longer and 5 shorter, all anther-bearing. Styles 5, persistent; stigmas terminal. Seeds 2 or more in each cell, with loose outer coat. (Gk. *oxus*=sour; from the taste of the herbage.)

A. Flowers yellow; stem erect, 1—3 dm. high. W. (*O. suksdorfii*.)

O. pumila Nutt. (Yellow Wood-sorrel)

AA. Flowers white or pinkish; stem none, the leaves and scapes from horizontal rhizomes.

B. Scapes 1-flowered, shorter than the leaves; petals 16—25 mm. long; capsule ovoid, 1 cm. long. W. C. *O. oregana* Nutt.

BB. Scapes about 6-flowered, as long as the leaves; petals 6—12 mm. long; capsule linear, 2—3 cm. long. W. C.

O. trilliifolia Hook.

LINACEAE

Flax Family

Herbs (ours) or shrubs. Leaves alternate or opposite or whorled (not ours); stipules small or none. Flowers perfect, regular. Sepals 5, rarely 4, persistent. Petals as many as the sepals and alternate with them, generally contorted. Stamens as many as the sepals, alternate with the petals; *filaments monadelphous at base; anthers versatile*. Ovary 1, 2—5-celled, or by false partitions 4—10-celled; styles 2—5. Fruit usually a capsule. Seeds 1—2 in each cell, *oily*.

LINUM

FLAX

Annual or perennial, sometimes woody at base. Leaves sessile; stipules none or mere glands. Flowers in axillary or terminal cymes or racemes or panicles. Sepals 5. Stamens sometimes with interspersed staminodia. Ovary 4—5-celled, or 8—10-celled by false partitions, the real cells 2-ovuled or the false ones 1-ovuled. Capsule 4—10-valved. (Celtic llin=a thread, Gk. linon=a thread, L. linum=the flax plant; because cloth is made from the bast fibers.)

A. Flowers white or pinkish or blue; leaves alternate, all entire.

B. Petals blue, rarely white, 10—20 mm. long; leaves 1—5 cm. long, linear to lanceolate or oval.

C. Perennial; petals 14—20 mm. long; stigma short, but little longer than wide; capsule much exceeding the calyx. E.

L. lewisii Pursh

CC. Annual; petals about 10 mm. long; stigma long, much longer than wide; capsule about as long as the calyx. W. E.

L. usitatissimum L. (Cultivated Flax)

BB. Petals white or rarely pinkish, never blue, 2—5 mm. long; leaves 0.6—1.5 cm. long, oblong-spatulate; annual. W.

L. micranthum Gray (White Flax)

AA. Flowers yellow; petals about 2 mm. long; plant annual; leaves mostly opposite, upper ones serrate, 0.5—1 cm. long, elliptic-spatulate. E.

L. digynum Gray (Yellow Flax)

POLYGALACEAE

Milkwort Family

Herbs (ours), rarely shrubs or small trees. Leaves alternate (ours) or in whorls; stipules none. Flowers in racemes (ours) or spikes or heads, or solitary and axillary, perfect, irregular; pedicels generally 2-bracted at base. Sepals 5, *very unequal, the lateral ones (wings) larger, colored*. Petals 3 or 5, hypogynous, more or less united into a tube; the lower one often crested. Stamens 6 or 8, *monadelphous or diadelphous; the tube split and adhering to the petals*. Fruit 2-celled, loculicidal (ours) or indehiscent.

POLYGALA

MILKWORT

Herbs with woody base (ours) or without, or shrubs. Leaves simple, entire. Sometimes some flowers cleistogamous and subterranean. Petals 3; corolla-tube split on the back, more or less adherent to the stamens. Capsule membranous; flattish, dehiscent along the margin; cells 1-seeded. Seed generally hairy (so in ours). (Gk. polys=much; gala=milk; the name of some Greek plant used to increase the flow of milk.) U.

P. californica Nutt.

EUPHORBIACEAE

Spurge Family

Herbs (ours) or shrubs or trees; *juice acrid, often milky*. Leaves alternate or opposite or whorled; stipules present or none. *Flowers* monoicous or dioicous, variously arranged, *mostly naked* or with the *calyx present* or represented by a scale at the base of the stamens; in *Euphorbia* subtended by an involucre resembling a calyx. Stamens 1—many. Ovary 1—3-celled; its cells 1—2-ovuled; styles as many as ovary-cells, simple or divided or many-cleft. Fruit a capsule, 2—3-celled, dehiscent.

A. Flowers involucrate; stamens usually 1; both staminate and pistillate flowers with only a rudimentary calyx or none at all; capsule 3-celled; cells each with 1 or more seeds. EUPHORBIA (p. 245)

AA. Flowers not involucrate; stamens 6—7; staminate flowers with a 5—6-parted calyx, pistillate flowers naked; capsule 1-celled, 1-seeded. PISCARIA (p. 245)

EUPHORBIA

SPURGE

Leaves alternate or opposite or whorled. Flowers small, usually monoicous, naked, subtended by a top-shaped or campanulate involucre. Staminate flowers numerous, of 1 naked stamen jointed upon a short pedicel which usually has a minute bract at the base. Pistillate flowers solitary, pedicelled, soon exerted. Ovary 3-celled, 3-ovuled; styles 3, usually 2-cleft. (Honor of Euphorbus, the physician to King Juba.)

A. Stems prostrate-spreading or nearly so; involucre-glands bearing petal-like appendages.

B. Plant pubescent; seed black. E.

E. maculata L. (Milk Spurge)

BB. Plant glabrous; seed gray.

C. Seed with 5—6 sharp transverse ridges; leaves linear-oblong to ovate. E. (*E. greeni*.) *E. glyptosperma* Engelm. (Ridge-seed Spurge)

CC. Seed pitted and somewhat transversely wrinkled; leaves oblong to spatulate. W. E. (*E. serpyllifolia consanguinea*.)

E. serpyllifolia Pers. (Thyme-leaved Spurge)

AA. Stems erect or nearly so; involucre-glands without petal-like appendages.

D. At least the upper leaves serrulate.

E. Seed pitted; glands with horn-like projections. U.

E. crenulata Engelm.

EE. Seed reticulate; glands blunt. E. (*E. arkansana missouriensis*.)

E. dictyosperma F. & M. (Net-seed Spurge)

DD. Leaves entire.

F. Leaves round-obovate; umbel 3-rayed. W.

E. peplus L. (Pretty Spurge)

FF. Leaves linear to oblong; umbel 4- to many-rayed.

G. Seed usually wrinkled; leaves linear to oblong. W.

E. lathyrus L. (Caper Spurge)

GG. Seed smooth; leaves filiform. E.

E. cyparissias L. (Cypress Spurge)

PISCARIA (Eremocarpus)

Annual, low, heavy-scented, hoary thruout with very dense stellate pubescence (ours). Leaves alternate, entire, ovate (ours), petioled; stipules none. Flowers small, in axillary clusters, without an involucre, dioicous or monoicous. Calyx of staminate flowers 5—6-parted; calyx of the pistillate flowers none. Stamens 6—7: receptacle hairy. Ovary

with 4—5 glands at the base, 1-celled, 1-ovuled, densely pubescent (ours). Capsule 2-valved. Seed smooth, shining. (L. piscaria=belonging to fish; because the Indians stupefied fish by throwing the herbage into the water.) E.

P. setigera Pip. (Turkey Mullein)

CALLITRICHACEAE Water Star-wort Family

Herbs, aquatic or rarely terrestrial in mud; stem slender or capillary. Leaves opposite, spatulate or linear; stipules none. Flowers minute, perfect or monoicous, axillary. Perianth none. Bracts none, or 2 and sac-like. Stamen 1. Pistil 1; ovary 4-celled; ovules 1 in each cell; styles 2. Fruit flattish, 4-lobed, 4-seeded; lobes somewhat winged or keeled; carpels separating at maturity, flattish.

CALLITRICHE

WATER STAR-WORT

Characters given under the family. (Gk. kalos=beautiful, trichos=hair; from the slender stems.)

A. Leaves all submerged, linear, 1-veined. W. E. (*C. bifida*.)

C. autumnalis L.

AA. Floating leaves obovate-spatulate, 3-veined.

B. Ovary without subtending bracts. E. (*C. sepulta*.)

C. marginata Torr.

BB. Ovary subtended by 2 bracts.

C. Fruit longer than the styles, obovate. W. C. E. (*C. verna*.)

C. palustris L.

CC. Fruit shorter than the styles, oval. W. E. (*C. bolanderi*.)

C. heterophylla Pursh

EMPETRACEAE

Crowberry Family

Shrubs, low. Leaves small, narrow, evergreen, nearly sessile, channeled on the lower side by the revolute margins; stipules none. Flowers small, dioicous or monoicous or polygamous, axillary (ours) or in terminal heads. Sepals 3. Petals 2—3 or none. Stamens 2—4. Pistil in staminate flowers rudimentary or none; pistil in pistillate flowers 1; ovary in ours 6—9-celled; cells 1-ovuled; style 1, in ours 6—9-lobed. Fruit berry-like.

EMPETRUM

CROWBERRY

Depressed or spreading; branches usually densely leafy, abundant. Leaves linear-oblong, entire. Petals usually 3. Stamens in staminate flowers 3. Ovary gibbose; style short, thick; stigma 6—9-rayed. Fruit black or red, containing 6—9-nutlets. (Gk. en=upon, petros=a rock; often growing in rocky places.) W. C.

E. nigrum L.

LIMNANTHACEAE

False-mermaid Family

Herbs, annual, glabrous, in wet places; juice acrid. Leaves alternate, pinnately-dissected or -compound; stipules none. Flowers solitary, axillary and terminal, bractless, regular, perfect, complete. Calyx-tube saucer-shaped. Sepals 2—5, persistent. Petals 2—5. Stamens 4—10, somewhat perigynous, those opposite the sepals with a gland outside the base. Pistil of 2—5 carpels; ovaries almost distinct, 1-ovuled, opposite the sepals; styles united to near the top, basal, central between the ovaries; stigmas 2—5. Carpels becoming somewhat fleshy but later dry, mostly tubercled, indehiscent (ours).

- A. Sepals 4—5; petals 4—5; stamens 10; stigmas 4—5. LIMNANTHES (p. 247)
 AA. Sepals 2—3; petals 2—3; stamens 6; stigmas 1—3. FLOERKEA (p. 247)

LIMNANTHES

Stems low, diffuse. Leaves pinnate or pinnately dissected; stipules none. Flowers showy, white or rose-colored or yellow. Sepals 4—5. Petals 4—5. Stamens 10. Carpels 4—5; in fruit hard, distinct, subglobose. (Gk. *limne*=a lake; *anthos*=a flower; from the common lake-shore habitat.)

- A. Sepals ovate, copiously white-villous; leaves more or less pubescent with long white hairs; petals white, slightly if at all emarginate. U.

L. floccosa How.

- AA. Sepals lanceolate, glabrous or with a few scattered hairs; leaves glabrous.

- B. Flower-parts in 5's; petals 6—18 mm. long.

- C. Petals much exceeding the sepals, emarginate to truncate at apex. U. (*L. gracilis*; *L. sulphurea*.) *L. douglasii* R. Br.

- CC. Petals hardly exceeding the sepals rounded at apex. U.

L. pumila How.

- BB. Flower-parts in 4's; petals 3—4 mm. long, not exceeding the sepals. W.

L. macounii Trel.

FLOERKEA

FALSE MERMAID

Stems diffuse. Leaf-divisions 3—5, rarely more, linear to elliptic, remote, entire. Flowers small, white. Sepals 2—3. Petals 2—3, oblong, entire, about 2 mm. long. Stamens 4—6. Mature carpels 1—3, fleshy. (Honor of G. H. Floerke, a German botanist.) W. E. (*F. occidentalis*.) *F. proserpinacoides* Willd.

ANACARDIACEAE

Sumac Family

Shrubs (ours) or trees; juice acrid, resinous or milky. Leaves alternate (ours) or opposite. Flowers mainly regular, perfect or polygamo-dioicous. Calyx 3—7-cleft or -parted. Petals as many as the sepals or rarely none. Stamens 1—2 times as many as the petals, rarely fewer, rarely more. Ovary in the staminate flowers 1-celled; ovary in the pistillate flowers 1- (ours) or 4—5-celled; styles 1—3 (in ours 3); cells 1-ovuled. *Fruit usually a small drupe.*

RHUS

SUMAC

Leaves simple (not ours) or 3-foliolate or odd-pinnate; stipules none. Flowers small, polygamous or dioicous, in axillary or terminal panicles or racemes or heads. Calyx 4—6-cleft or -parted, persistent. Petals equal, spreading. Stamens 5 (ours). Pistil 1, sessile; ovary 1-celled, 1-ovuled. *Drupe small, 1-seeded, mostly globose, pubescent or glabrous.* (Celtic *rhudd*=red, hence Gk. *rhus*=these plants, on account of the red fruit.)

- A. Leaflets 11—31; fruit red, pubescent. E. (*R. glabra occidentalis*; *R. cismontana*.) *R. glabra* L. (Smooth Sumac)

- AA. Leaflets 3; fruit white or red, glabrous.

- B. Plant with unpleasant odor; flowers in spikes or heads; fruit red. W. C. E.

R. trilobata Nutt. (Skunk Bush)

- BB. Plant without unpleasant odor; flowers in panicles; fruit white, smooth or striate.

- C. Leaflets mostly subentire, the lateral ones petioled. E. (*R. rydbergii*.)

R. toxicodendron L. (Poison Ivy)

CC. Leaflets mostly crenate, the lateral ones sessile. W.

R. diversiloba Torr. (Poison Oak)

CELASTRACEAE

Staff-tree Family

Shrubs (ours) or trees, often climbing (not ours). Leaves alternate or opposite, simple; stipules none or small. Flower regular, usually perfect, small; pedicels usually jointed. Calyx 4—5-lobed or -parted, persistent. Petals 4—5, spreading. Stamens on the disk, alternate with the petals. Disk conspicuous. Ovary sessile, distinct or united with the disk, 1—5-celled; styles short, thick; stigma entire or 2—5-lobed; ovules 2—4 in each cell. Fruit a capsule or follicle, fleshy or membranous.

A. Leaves opposite, ovate to lanceolate, serrulate; branches not spiny; stamens 4 or 5; flower-parts in 4's or 5's.

B. Shrub 1 m. or less high; leaves evergreen, 1.2—2.5 cm. long; flower-parts in 4's; ovary 2-celled. PACHISTIGMA (p. 248)

BB. Shrub 2—5 m. high; leaves deciduous, 5—10 cm. long; flower-parts in 5's; ovary 3—5-celled. EUONYMOUS (p. 248)

AA. Leaves alternate, deciduous, oblanceolate, entire; branches spiny; stamens 10; flower-parts in 5's. FORSELLESIA (p. 248)

PACHISTIMA

Plant 3—9 dm. high (ours). Leaves opposite, evergreen; in ours smooth, ovate to lanceolate, serrulate above, 1.2—2.5 cm. long. Flowers axillary, solitary or in few-flowered cymes. Calyx-tube short, obconic; lobes 4, rounded. Petals 4. Stamens 4. Disk wide, lining the calyx-tube. Ovary free, 2-celled. Capsule 2-valved, 1—2-seeded. Seed in a white many-cleft membranous covering. (Gk. *pachis*=thick, +*stigma*.) W.

C. E.

P. myrsinites Raf.

EUONYMOUS

SPINDLE-TREE

Ours 2—5 m. high, smooth, straggling; branches 4-angled, greenish (ours). Leaves opposite, deciduous; in ours ovate to oblong-lanceolate, acuminate, smooth, serrulate, 5—10 cm. long; stipules small, deciduous. Flowers in cymes; cymes axillary, 1- to many-flowered. Calyx-segments 5 (ours), widely spreading. Petals 5 (ours). Stamens 4—5 (5 in ours), very short, on a broad ring-like disk. Ovary 3—5-celled. Style short or none. Capsule 2—6-lobed, 3—5-valved, loculicidal, coriaceous, colored, often warty (not ours). Seeds 1—4 in each cell, covered with a fleshy red pulp. (Gk. *eu*=good, *onoma*=name; applied in irony, since it was thought to poison cattle.) W. C.

E. occidentalis Nutt. (Western Wahoo)

FORSELLESIA (Glossopetalon)

Low, rigid, 6—9 dm. high (ours). Branches slender, spiny. Leaves alternate, entire, oblanceolate (ours), petioled (ours), small, separating in age from a scale-like base which bears 2 stipules; stipules setaceous-subulate, adherent to the scales. Flowers solitary, axillary. Disk 8—10-lobed. Petals white (ours), near margin of disk. Stamens 8 or 10. Pistil simple; ovary ovoid; style very short or none; stigma entire or obscurely 2-lobed (ours); ovules 2. Fruit a follicle, firm, coriaceous, opening down the ventral suture, 1—2-seeded. (Origin?) E.

F. spinescens Gr.

ACERACEAE

Maple Family

Shrubs or trees; sap watery, often sweet. Leaves opposite, simple or 3-foliolate, palmately lobed or rarely entire (not ours), or rarely pinnate. Flowers polygamous or dioicous, regular, cymose or racemose, axillary or terminal. Calyx usually 5-parted. Petals none or 5. Disk thick, ring-like, lobed, sometimes almost none. Stamens 3—12, often 8. Ovary 2-lobed, 2-celled; styles 2, between the lobes. Fruit composed of 2 carpels or rarely 3 or 4; carpels united at base, winged, indehiscent. Seeds 1 or rarely 2 in each carpels, flattish.

ACER

MAPLE

Flowers small. Calyx colored. Carpels 1-ovuled. (Celtic ac=hard or sharp, hence *L. acer*=these plants, since their hard wood was prized for making weapons.)

A. Leaves simple or 3-foliolate; disk present.

B. Leaves 7—9-lobed, 7.5—13 cm. wide; flowers in corymbs; fruit glabrous; mature carpels spreading at about 180°, 2—3.2 cm. long. W. C. E.

A. circinatum Pursh (Vine Maple)

BB. Leaves 5—7-lobed, 15—37 cm. wide; flowers in racemes; fruit hispid; mature carpels spreading at about 90° or less, 3.7—5 cm. long. W. C. E.

A. macrophyllum Pursh (Large-leaved Maple)

BBB. Leaves 3—5-lobed or 3-foliolate, 2.5—7.5 cm. wide; flowers in corymbs; fruit glabrous; mature carpels spreading at about 90° or less, 2—3 cm. long. W. C. E. (*A. douglasii*.)

A. glabrum Torr. (Rocky Mountain Maple)

AA. Leaves 3—9-foliolate; disk none. W. E. (*Negundo aceroides*.)

A. negundo L. (Box Elder)

BALSAMINACEAE

Touch-me-not Family

Herbs (ours) or undershrubs, succulent (ours). Leaves alternate, thin, simple, dentate, petioled. Flowers somewhat clustered, axillary, showy, very irregular. Sepals apparently 4, the 1 notched at apex is probably 2 combined; rear one large, petal-like, saccate, often spurred. Petals 2—5. Stamens 5, short; filaments with scales on inner side, somewhat united; anthers somewhat united. Ovary oblong, 5-celled; style very short or none; stigma 5-toothed or -lobed; cells several-ovuled. Fruit (in ours) a capsule, oblong or linear, dehiscent into 5 spirally coiled valved. Seed oblong, ridged.

IMPATIENS

TOUCH-ME-NOT

Annual and glabrous (ours). Stems somewhat transparent. Petals 4, apparently only 2 by the union of the lateral with the adjacent lower ones. Cells of the ovary formed by the membranous projections of the placentae which occupy the axis of the ovary and are connected with its apex by 5 slender threads. Capsule often 1-celled by the disappearance of the partitions. (Impatient in that the ripe capsule flies into pieces when touched.)

A. Posterior sepal spurred. Corolla often spotted.

B. Spurred sepals slightly longer than wide; sac at least $\frac{2}{3}$ as wide as long, abruptly contracted into a spur; corolla with large spots or rarely unspotted. E. (*I. fulva*; *I. auriella*.)

I. biflora Walt. (Spotted Touch-me-not)

BB. Spurred sepal much longer than wide; sac not over $\frac{1}{2}$ as long as wide, gradually tapering into a spur; corolla unspotted. W. C. (*I. occidentalis*; *I. pallida* for our region.)

I. nolitangere L. (Garden Touch-me-not)

AA. Posterior sepal unspurred, wider than long; corolla pale yellow, unspotted. E.

I. ecalcarata Blank. (Spurless Touch-me-not)

RHAMNACEAE

Buckthorn Family

Shrubs or trees; branches sometimes spiny. Leaves simple, alternate or opposite: stipules minute. Flowers small, dioicous or monoicous or polygamous or perfect. Calyx 4—5-cleft. Petals none or distinct, each wrapped around a stamen, on the calyx-throat. Stamens as many as calyx-lobes, alternate with them. Ovary 1, superior or partly inferior, 2—4-celled, cells 1-ovuled; styles more or less united into 1; stigmas 2—4. Fruit either fleshy or dry and the carpels at length separating.

A. Calyx and disk free from the ovary; calyx-lobes erect or spreading; fruit berry-like; flowers solitary or in umbels or cymes or racemes. RHAMNUS (p. 250)

AA. Calyx and disk adnate to the base of the ovary; calyx-lobes connivent; fruit dry or nearly so; flowers in panicles or corymbs. CEANOTHUS (p. 250)

RHAMNUS

BUCKTHORN

Leaves alternate, pinnately veined, deciduous (ours) except occasionally on very young plants. Flowers small, axillary, cymose or racemose or paniculate, perfect or polygamous. Calyx-tube urn-shaped; calyx-limb 4—5-toothed. Petals 4—5 or none. Disk free from the ovary. Ovary 3—4-celled; style 3—4-cleft. Fruit berry-like, oblong or globose, containing 2—4 separate nutlets or stones. (Said to be from Celtic rham—a tuft of branches; Gk. rhamnos—the name of these plants.)

A. Leaves acute at each end; petals none; seed grooved on the back; plants 0.6—1.2 m. high. E. R. *alnifolia* L'Her.

AA. Leaves acute at one end or at neither; petals 5, small; seed not grooved on the back; plants 0.6—1.5 m. high.

B. Plant 5 m. or less high; leaves not undulate, somewhat revolute at margin; carpels 3. E. R. *californica* Esch.

BB. Plants 15 m. or less high; leaves often undulate; not revolute at margin; carpels 2. W. C. E. (R. *occidentalis*.)

R. *purshiana* DC. (Cascara)

CEANOTHUS

RED-ROOT

Leaves pinnately veined or with several chief veins from the base. Flowers in lateral and terminal dense thyrsoid panicles or corymbs. Calyx 5-cleft; lobes acute, deciduous; tube persistent, turbinate or hemispheric. Disk thick. Petals 5, longer than the calyx, saccate, arched, long-clawed. Styles 3, somewhat united below. Fruit subglobose, 3-lobed, surrounded at base by the adherent calyx-tube, soon dry; the 3 crustaceous nutlets ultimately separating and dehiscing. (Gk. keanothos—the name of a kind of thistle; probably transferred on account of the spiny branches of some.)

A. All of the leaves alternate, with 3 chief veins from the base, glandular-toothed or entire; fruit not crested.

B. Flowers in thyrses; leaves often longer than 30 mm.; branches not strikingly rigid, not spiny.

C. Leaves evergreen, shining above as if varnished, sticky above, with strong cinnamon odor; flowers white. W. C. E. (C. *laevigatus*.)

C. *velutinus* Dougl. (Mountain Balm)

CC. Leaves deciduous, not as if varnished above, not sticky above, without strong odor.

D. Leaves ovate to elliptic; flowers white; twigs terete. W. C. E.

C. *sanguineus* Pursh (Buck-brush)

- DD. Leaves oblong to lanceolate; flowers mostly blue; twigs more or less angular.
 E. Leaves entire or serrulate only near the apex. W. E. (*C. californicus*.)
 C. integerrimus H. & A. (California Lilac)
 EE. Leaves serrulate to base or nearly so. U.
 C. thyrsiflorus Esch. (California Lilac)
 BB. Flowers in racemes; leaves 8—30 mm. long; branches usually rigid and spiny.
 F. Leaves ovate; inflorescence 5—7.5 cm. long, dense; flowers pale-blue or white; capsules not lobed; shrub tall, usually arborescent. C. E.
 C. divaricatus Nutt.
 FF. Leaves elliptic; inflorescence about 2—3 cm. long, loose; flowers white; capsules lobed at the top; shrubs low flat-topped. U.
 C. cordulatus Kell.
 AA. Most of the leaves opposite, with one chief vein from the base, with numerous straight parallel lateral veins, spine-toothed or entire; fruit crested with 3 horn-like or wart-like processes below the summit.
 G. Flowers white; plant erect or depressed but not prostrate; leaves entire. W. (*C. pumilus*.)
 C. cuneatus Nutt. (Chaparral)
 GG. Flowers blue or purple; plants prostrate; leaves with several teeth near the apex. U. C. E.
 C. prostratus Benth. (Mahala Mats)

VITACEAE

Grape Family

Shrubs, viney, climbing by tendrils. Leaves simple (ours) or compound, the upper opposite the flower-clusters or the tendrils. Flowers in racemes or thyrsoid panicles, small. Calyx minute, 4—5-toothed or nearly entire. Petals 4—5, inflexed. Disk in the calyx, bearing the stamens and petals. Stamens as many as petals, opposite them. Ovary 2-celled; cells 2-ovuled; style short or none; stigma simple. *Fruit a berry, globose, mostly pulpy, often 1-celled by abortion. Seed hard.*

VITUS

GRAPE

Juice acid. Leaves opposite (ours) palmately veined and often palmately lobed. Disk filling the calyx-tube. Petals thick, greenish. (L. *vitis*=a vine, and hence the name of the chief vine, the grape.) U.

V. californica Benth. (Wild Grape)

MALVACEAE

Mallow Family

Herbs (ours) or shrubs or trees. *Leaves alternate, mostly palmately veined; stipules small, deciduous.* Flowers regular, perfect (ours) or rarely polygamous or dioicous, often large. Sepals 5 (ours) or rarely 3—4, somewhat united, often with bracts just beneath. Petals 5, hypogynous. *Stamens many, monadelphous, forming a central column around the style, united with the bases of the petals.* Ovary several-celled, entire or lobed; *styles united below, distinct above, usually as many as ovary-cells.* *Fruit a capsule (ours) or rarely a berry; carpels falling away entire or else opening loculicidally.*

A. At least the upper leaves lobed, usually all lobed; palmately veined.

B. Style-branches filiform, not head-like at tip; carpels 1-ovuled, 1-seeded.

C. Stamens in 1 series, united; involucre-bracts below the calyx 3; carpels 15—20. MALVA (p. 252)

CC. Stamens in 2 series, united in the outer, distinct in the inner; involucre-bracts below the calyx none; carpels 5—9. SIDAŁCEA (p. 252)

- BB. Style-branches tipped with a head-like stigma.
 D. Carpels 1-ovuled, 1-seeded; upper leaves palmately parted; fruit flat, cheese-shaped. MALVASTRUM (p. 253)
 DD. Carpels 1—3-ovuled, 1—3-seeded; none of the leaves more deeply lobed than half way to the base; fruit conical. SPHAERALCEA (p. 253)
 AA. Leaves not lobed; palmately or pinnately veined.
 E. Leaves 5 cm. or less wide; carpels 6—10, 1—2-seeded; plants often not densely velvety-pubescent.
 F. Petals red or rose-colored; carpels 1—2-seeded, extended upward as an empty portion. SPHAERALCEA (p. 253)
 FF. Petals white or yellow; carpels 1-seeded, filled by the seed. SIDA (p. 253)
 EE. Leaves 10—20 cm. wide; carpels 12—15, 3-seeded; plants densely and finely velvety-pubescent. ABUTILON (p. 254)

MALVA

MALLOW

Annual or biennial or perennial, glabrous or hairy. Leaves lobed or dissected, palmately veined. Flowers solitary in the leaf-axils, or rarely in terminal racemes. Involucre none or present, usually of 3 bractlets. Petals obcordate. Stamen-column usually divided above into numerous filaments. Carpels numerous, 1-ovuled. Fruit depressed, somewhat cheese-form; carpels in a ring around a broad central axis, free, separating, indehiscent, beakless; axis not projecting beyond the carpels. (Gk. malache=soft; because the crushed herbage is mucilaginous.)

- A. Stem-leaves dissected into linear lobes; carpels very hairy; plant erect; flowers 2.5—5 cm. wide. W. M. moschata L. (Musk Mallow)
 AA. Stem-leaves merely crenate or with rounded shallow lobes; carpels glabrous or puberulent; plants erect to procumbent; flowers 0.8—1.4 cm. wide.
 B. Stems procumbent; leaves rounded; carpels puberulent, not reticulate on the back. W. E. M. rotundifolia L. (Fairy Cheeses)
 BB. Stems erect or ascending; leaves somewhat angular-lobed; carpels glabrous, reticulate on the back. W. (M. borealis for our region.)
 M. parviflora L.

SIDALCEA

Annual or perennial (ours). Leaves more or less deeply lobed, palmately veined. Flowers purple or white, in terminal racemes or spikes. Involucre none. Stamen-column double; filaments of outer series united into 5 sets, opposite the 5 petals; filaments of the inner series distinct. Style filiform. Carpels 5—9, 1-seeded, separating at maturity from the short axis, sometimes beaked, indehiscent. (Sida=another genus of this family, +Gk. alkea=a mallow.)

- A. Petals 8—13 mm. long; calyx 4—8 mm. long.
 B. Flowers in racemes, either simple or paniculate.
 C. Calyx-lobes attenuate-acuminate from a wide base. W. (S. virgata.)
 S. glaucescens Gr.
 CC. Calyx-lobes broadly-deltoid. W. E.
 S. oregana Gray
 BB. Flowers in long dense spikes. U.
 S. spicata Gr.
 AA. Petals 15—30 mm. long; calyx 8—15 mm. long.
 D. Petals rose-colored; calyx 6—10 mm. long; mature carpels more or less reticulate on the back.

E. Stems 4—7 cm. high; carpels glabrous. E.

S. nervata Nels.

EE. Stems 6—15 dm. high; carpels pubescent. W. E. (*S. malvaeflora* for our region.)

S. campestris Gray

DD. Petals red; calyx 12—15 mm. long; mature carpels smooth. W.

S. hendersoni Wats.

MALVASTRUM

FALSE MALLOW

Perennial (ours), densely and silvery stellate pubescent (ours). Leaves entire (not ours) or serrate or divided. Flowers axillary or terminal, solitary or in racemes (ours), red, 12 cm. wide (ours); pedicels short. Involucre none or of 1—3 small bracts. Carpels 5—many (ours 10—15), 1—2-ovuled; stigmas head-like. Fruiting carpels indehiscent (ours) or imperfectly 2-valved, falling away from the axis, pointed or beaked, rugose-reticulate. (*Malva*, +Gk. astron=a star. Why?) E.

M. coccineum Gray

SPHAERALCEA

GLOBE MALLOW

Perennial. Leaves angular or lobed, palmately veined. Flowers mostly showy, solitary or fascicled or in terminal racemes. Involucre 2—3-leaved, setaceous, often deciduous. Stamen-column simple, filaments distinct above, numerous. Styles 5 or more; stigmas head-like. Ovules 1—3 in each carpel. Fruit conical; carpels 2-valved above, upper part smooth, lower part rugose-reticulate on the sides. Seed reniform. (Gk. sphaira=a sphere, alkea=a mallow; referring to the commonly spherical fruit.)

A. Leaves canescent, 2.5—5 cm. long, 3—5-lobed or not lobed; flowers usually scarlet; calyx-lobes 4—6 mm. long. E.

S. munroana Spach

AA. Leaves not canescent, 5—15 cm. long, 3—7-lobed or -cleft; flowers usually rose-colored.

B. Calyx-lobes ovate, 4—6 mm. long; pedicels usually less than 6 mm. long. E. (*S. acerifolia*; probably *S. rivularis diversa*.)

S. rivularis Torr.

BB. Calyx-lobes caudate-acuminate, 15—25 mm. long; pedicels 10 mm. or more long. E. (*S. leptosepala* for our region.)

S. longisepala Torr.

SIDA

OBLIQUE MALLOW

Annual or perennial, pubescent or tomentose. Leaves pinnately or palmately veined. Flowers white or yellow, axillary, solitary or fascicled. Calyx with or without an involucre. Stamen-tube simple. Petals oblique. Styles 5 or more; stigmas head-like. Carpels 5 or more (6—10 in ours), 1-seeded, separating from the axis, indehiscent or 2-valved. (Greek name of some plant.)

A. Plant scurfy-canescant, perennial; leaves reniform to ovate-cordate; calyx subtended by an involucre of 2—3 bractlets. E.

S. hederacea Torr.

AA. Plant glabrous or puberulent, annual; leaves lanceolate to ovate-cordate; calyx not subtended by an involucre. W. (*S. spinosa* for our region.)

S. acuta Burm.

ABUTILON

INDIAN MALLOW

Plants mostly soft-pubescent (ours so). Leaves cordate (ours) or angular or lobed, 1—2 dm. wide, palmately veined. Flowers axillary, solitary, 12—18 mm. wide (ours.) Petals yellow (ours). Involucre none. Ovary 5- to many-celled (12—15 in ours); cells 3—9-ovuled. Head of fruit 2—3 cm. wide (ours). Carpels 2-valved, often rosstrate (so in ours), falling away from the axis at maturity. (A name of unknown significance given these plants by the Arabian physician Avicenna.) W. (*A. avicennae*.)

A. theophrasti Medic. (Velvet-leaf)

HYPERICACEAE

St. John's-wort Family

Herbs (ours) or shrubs or trees. Leaves *opposite* (ours) or whorled, entire (ours) or rarely glandular-ciliate or dentate, *pellucid-punctate* or *black-dotted*; *stipules none*. Flowers terminal or axillary, solitary or cymose-paniculate, regular, perfect. Sepals 4—5 (ours). Petals 4—5 (ours), usually oblique or contorted. Stamens 5—many, often in sets of 3 or 5. Ovary *superior*, 1—7-celled; carpels 1—7; styles as many as the carpels; ovules many, in 2 rows in each cell. Fruit usually a capsule (so in ours), septicidal. Seed straight.

HYPERICUM

ST. JOHN'S-WORT

Annual or perennial. Flowers mostly in cymes. Petals yellow. Ovary either 1-celled with 3—5 parietal placentae which sometimes project far into the cavity, or else ovary 3—6-celled. Capsule 1—6-celled. (Meaning unknown; said to be from Gk. hyper=under, +*Erica*=a heather.)

A. Plants low, often prostrate or ascending, often matted; stems 2.5—30 cm. long, often much branched. W. C. E. (*H. bryophytum*; *H. anagalioides nevadense*; probably *H. tapetoides*.) *H. anagalioides* C. & S. (Creeping St. John's-wort)

AA. Plants erect, 3—20 dm. high; stems simple or nearly so.

B. Plant annual; stamens 5—10; capsule 1-celled; sepals linear-lanceolate, attenuate. W. (*H. canadense majus*.)

H. majus Brit.

BB. Plant perennial; stamens more than 12; capsule 3-celled.

C. Sepals lanceolate, acute or acuminate; capsule not lobed. W.

H. perforatum L. (Common St. John's-wort)

CC. Sepals oval or oblong, obtuse; capsule 3-lobed. W. E. (*H. scouleri*.)

H. formosum HBK.

ELATINACEAE

Water-wort Family

Herbs (ours), low. Leaves *opposite* (ours) or whorled, entire or serrate; *stipules present*. Flowers small, axillary, solitary or fascicled, perfect, regular. Sepals 2—5. Petals as many as the sepals. Stamens 1 or 2 times as many as sepals. Ovary superior, 2—5-celled; styles 2—5; ovules many. Capsule septicidal; placentae central. Seed crustaceous, rugose or ribbed.

A. Flower-parts in 2's or 3's or 4's; plant glabrous, aquatic or creeping; sepals obtuse, without mid-vein.

ELATINE (p. 255)

AA. Flower-parts in 5's; plant pubescent, ascending or diffuse; sepals pointed or acute, with mid-vein.

BERGIA (p. 255)

ELATINE

WATER-WORT

Glabrous or glabrate, aquatic or creeping. Leaves entire. Flowers minute, mainly solitary. Sepals 2—4, persistent, membranous, not veined. Petals in ours white or rose-colored or purplish. Styles or stigmas 2—4. Pod membranous, 2—4-valved, glabrous. Seeds longitudinally and transversely striate. (Gk. elate=fir; because some species have narrow fir-like leaves.)

A. Sepals and petals and carpels and stamens 2—3; seed nearly straight; petals rose-colored or purplish.

B. Sepals and petals and stamens usually 3; seeds but little sculptured; leaves oblanceolate. E. *E. triandra* Schk.

BB. Sepals and petals and stamens usually 2; seeds distinctly sculptured; leaves obovate. W. E. *E. americana* Arn.

AA. Sepals and petals and carpels 3—4; stamens 6 or 8; seeds curved into a hook or partial ring; petals white; leaves obovate. E.

E. californica Gray (California Water-wort)

BERGIA

Annual (ours), branching, erect (not ours) or ascending or prostrate, somewhat pubescent. Leaves in ours serrate, spatulate or obovate, 2.5—3.7 cm. long. Flower-parts in 5's (ours), rarely in 4's or 3's. Sepals acute, slightly longer than the petals (ours). Petals white or whitish (ours). Pod crustaceous, ovoid, 5-valved. Seeds longitudinally and transversely striate. (Honor of J. P. Bergius, a Swedish botanist.)

E. *B. texana* Seub.

VIOLACEAE

Violet Family

Herbs (ours) or shrubs. *Leaves alternate* or opposite (not ours) or basal, simple, entire or lobed or lacinate, pinnately or palmately veined; *stipules present*. *Flowers* solitary or clustered, perfect, *mostly irregular*. Sepals 5, equal or unequal. Petals 5, hypogymous, imbricated in the bud. Anthers erect, connivent in a ring or cyngenesious, sessile or on short filaments. *Ovary* 1, 1-celled; *placentae* 3, *parietal*; style simple; stigma generally oblique. Capsule dehiscent by valves (ours) or berry-like. Endosperm abundant.

VIOLA

VIOLET

Annual or perennial (ours). Leaves alternate or all basal, evergreen or deciduous. Flowers axillary or scapose, solitary or rarely 2 together, often of 2 kinds; early flowers petal-bearing, showy, often sterile, long-scaped or -peduncled; late flowers short-peduncled or on runners or stolons, producing many seeds, apetalous or cleistogamous. Sepals of the petal-bearing flowers nearly equal, somewhat eared at base. Petals spreading; the lower one large, spurred or saccate. Stamens 5, 2 spurred. Capsule dehiscent into 3 valves. (The Latin name.)

A. Leaves cleft or more deeply separated into lobes or divisions: stem present; petals yellow, the upper one brownish or purplish.

B. Leaves once lobed or dissected into 5—9 lobes or teeth; with creeping rhizomes.

U. *V. lobata* Benth.

BB. Leaves 2—3 times dissected or lobed; lobes usually more than 9; without creeping rhizomes.

C. Petals beardless, yellow or the upper one brownish.

- D. Leaves short-pubescent, ternately divided into 3 segmented lobes. U. (*V. douglasii*.) *V. chrysantha* Hook.
- DD. Leaves glabrous, pinnately divided into 5 or more segmented lobes. U. C. *V. sheltoni* Torr.
- CC. Lateral petals bearded with a tuft of hairs; upper petals deep blue or violet-purple.
 - E. Plant pubescent; leaves rounded in general outline, and their segments linear or linear-spatulate. C. E. *V. beckwithii* T. & G.
 - EE. Plant glabrous; leaves either not rounded in general outline, or else their lobes lanceolate or ovate-lanceolate.
 - F. Leaf-segments veinless or obscurely veined; stipules adnate, often large, lacinate or entire. W. *V. hallii* Gray
 - FF. Leaf-segments prominently 3-veined; stipules free, small, entire. E. *V. trinervata* How.
- AA. Leaves very shallowly lobed or merely toothed or even entire.
 - G. Petals yellow.
 - H. Stems prostrate, stolon-like; leaves evergreen.
 - I. Leaves cordate; leafy branches producing petal-bearing flowers. W. C. E. (*V. sarmentosa*.) *V. sempervirens* Gr. (Evergreen Violet)
 - II. Leaves reniform; leafy branches producing only apetalous flowers. C. E. *V. orbiculata* Gray
 - HH. Stems erect, not stolon-like; leaves not evergreen.
 - J. Plant glabrous.
 - K. Leaves ovate or ovate-lanceolate, acute or obtuse; capsule globose, pubescent. W. C. E. (*V. purpurea*.) *V. venosa* Pip.
 - KK. Leaves round-cordate or reniform, acuminate or acute; capsule oblong, glabrous. W. C. E. *V. glabella* Nutt.
 - JJ. Plant pubescent. W. C. E. (*V. brooksii*; *V. praemorsa*; *V. nuttallii* *praemorsa*; *V. nuttallii* *major*; *V. flavovirens*; *V. linguifolia*.) *V. nuttallii* Pursh (Hairy Yellow Violet)
 - GG. Petals some other color.
 - L. Plants stemless.
 - M. Plant hirsute or villous, not stoloniferous; petals 10—17 mm. long, blue or violet; all bearded at base. E. *V. cuspidata* Gr.
 - MM. Plant glabrous or very nearly so.
 - N. Leaves ovate to spatulate-oblong, attenuate to the petiole; plant stoloniferous. U. (*V. occidentalis*.) *V. primulaefolia* L. (Primrose Violet)
 - NN. Leaves truncate to cordate at base, not attenuate to the petiole.
 - O. Petals 6—8 mm. long, white or light-blue or violet, lower ones with purple veins; plants stoloniferous.
 - P. Corolla white; lower 3 petals with purple lines. W. C. E. (*V. macloskeyi*.) *V. blanda* Willd.
 - PP. Corolla violet. W. C. E. *V. palustris* L. (Marsh Violet)
 - OO. Petals 10—25 mm. long, violet.

- Q. Petals 10—17 mm. long; plant not stoloniferous; stipules less than 12 mm. long. W. E. (*V. cognata*)
V. nephrophylla Gr.
- QQ. Petals 19—25 mm. long; plant stoloniferous; stipules 12—21 mm. long. W. *V. langsdorffii* Fisch.
- LL. Plants with stems.
- R. Stipules or at least those of the basal leaves serrate or laciniate, scarious or herbaceous.
- S. Plant puberulent or glabrous; stipules herbaceous.
- T. Leaves usually brown-dotted at least beneath; none of the stipules entire.
- U. Plant usually 7—30 cm. high, glabrous; leaves 1.3—3.8 cm. long. W. C. E. (*V. adunca oxyceras*)
V. adunca Sm.
- UU. Plant 3—5 cm. high, densely puberulent; leaves 1—2 cm. long. W. C. (*V. puberula*)
V. arenaria DC. (Sand Violet)
- TT. Leaves not dotted; stipules of the stem-leaves entire. W.
V. howellii Gray
- SS. Plant pubescent.
- V. Pubescence retrorse; stipules herbaceous; flowers violet. W. C. E.
V. retroscabra Gr.
- VV. Pubescence not retrorse; stipules scarious; flowers white or somewhat yellowish, with purplish veins. U.
V. ocellata T. & G.
- RR. Stipules all entire, scarious.
- W. Leaves rhombic ovate with cuneate bases except sometimes the basal. U.
- WW. Leaves cordate or reniform.
V. cuneata Wats.
- X. Leaves cordate, acuminate. E.
V. canadensis L. (Canada Violet)
- XX. Leaves reniform, obtuse. W.
V. flettii Pip.

LOASACEAE

Stick-leaf Family

Herbs, erect (ours) or climbing, branching, *often with hooked or stinging or viscid hairs*. Leaves alternate (ours) or opposite, pinnately veined, simple; stipules none. Flowers solitary or racemose or cymose, regular, perfect, white or yellow or reddish (not ours). Calyx 4—5-lobed (5 in ours), persistent. Petals 4 or 8, or (ours) 5 or 10, on the calyx. Stamens many, on the calyx, usually in clusters opposite the petals; outer filaments sometimes petal-like. Ovary inferior, 1-celled (ours), rarely 2—3-celled; placenta 2—3, parietal; style filiform, entire or 2—3-lobed. Capsule usually 1-celled (so in ours), bearing the calyx-lobes.

MENTZELIA

STICK-LEAF

Annual or biennial. Leaves mostly coarsely toothed or pinnatifid. Flowers mostly large, cymose or solitary, terminal. Calyx-tube cylindric to obconic. Petals 5 to 10, spreading. Stamens 20—300. Capsule opening at tip, few- to many-seeded. Seeds flat, sometimes winged, rough or smooth. (Honor of C. Mentzel, a German botanist.)

- A. Biennials; flowers 2.5—6.3 cm. long; each placenta with 2 rows of ovules; ovules separated by horizontal lamellae; capsule linear; petals 5 or 10.
- B. Leaves lanceolate; petals 10.
- C. Outer petals less than 5 cm. long; plant 2—2.5 dm. high; some of the anther-bearing filaments dilated. E.
M. pumila Nutt.
- CC. Outer petals 5—6.2 cm. long; plant 6—9 dm. high; all of the filaments filiform. E.
M. laevicaulis T. & G.
- BB. Leaves linear; petals 5. E.
M. brandegei Wats.
- AA. Annual: flowers 0.3—1.6 cm. long; each placenta with 1 row of ovules; ovules not separated by horizontal lamellae; capsule oblong; petals 5.
- D. Seed tuberculate, more or less grooved along the angles; leaves usually sinuate-toothed. E. (*M. dispersa*.) *M. integrifolia* Rydb.
- DD. Seed smooth or striate.
- E. Flowers not bracted; seed 0.7—1.4 mm. long. E. (*M. gracilentia*; *M. tenerima*.)
M. albicaulis Dougl.
- EE. Flowers conspicuously bracted with wide toothed bracts; seed almost 2 mm. long. E.
M. congesta T. & G.

CACTACEAE

Cactus Family

Stems fleshy, flattish or terete, often ridged or tubercled, continuous or jointed, generally spiny, the spines arising from cushions of minute bristles. Leaves none or small, subulate. Flowers mostly solitary, sessile, terminal or lateral, perfect, regular, showy. Calyx many-lobed or of distinct sepals. Petals numerous, in several rows, mostly distinct. Stamens numerous, on throat of calyx. Ovary inferior, 1-celled; placentae several, parietal; styles terminal, united, elongated; stigmas many. Fruit mostly fleshy, sometimes nearly dry. Seeds many, smooth, tubercled.

- A. Stems not jointed, ovoid, not branched; "eyes" raised on conspicuous tubercles.
MAMILLARIA (p. 258)
- AA. Stems jointed, branched; "eyes" not raised on tubercles. OPUNTIA (p. 258)

MAMILLARIA

BALL CACTUS

Plants globose or somewhat cylindric; stems solitary or clustered, tubercled; tubercles conic or cylindric, woolly with clusters of spines at apex. Leaves none. Flowers usually in a transverse zone of the stem, in ours bright red or purple. Calyx-tube campanulate or funnellform, produced beyond the ovary which is often hidden between the tubercles; exterior calyx-segments ciliate (ours). Ovary smooth, ovoid or club-shaped or oval (ours); stigmas 5—7, radiate. Fruit smooth, ovoid (ours). (L. mamilla—a nipple; referring to the tubercles.) E. (*Cactus viviparus*.)

M. vivipara Haw.

OPUNTIA

OPUNTIA

Stems jointed, branching; joints flat or cylindric. Leaves minute or none, deciduous, spirally arranged on the stem, mostly subulate; "eyes" mostly spine-bearing. Flowers usually lateral. Calyx-tube not prolonged beyond the ovary; calyx-lobes spreading. Ovary cylindric, exserted; stigmas 2—7. Fruit pear-shaped, often spiny. (Grew in Greece near the town of Opuntia.)

A. Joints of the stem decidedly flattened; spines 8—15 from the same place. W. E.
(*O. polycantha borealis*; *O. polycantha platycarpa*.)

O. polycantha Haw. (Spiny Opuntia)

AA. Joints of the stem ovate or subglobose, nearly terete; spines 1—4 from the same place. E.

O. fragilis Haw. (Fragile Opuntia)

ELEAGNACEAE

Oleaster Family

Shrubs (ours) or trees, mostly *silvery-scaly* or *stellate-pubescent*. Leaves alternate or *opposite* (ours). Flowers perfect (not ours) or polygamous or dioicous, clustered, in axils or at nodes of previous season, rarely solitary. Perianth of the perfect or pistillate flowers tubular or urn-shaped below, persistent; upper part 4-lobed or -cleft (ours), deciduous. *Corolla none*. Stamens 4—8, those of perfect flowers on throat of perianth; Ovary sessile, 1-celled; ovule 1; style slender. *Fruit drupe-like*, the perianth becoming thickened and fleshy and enclosing the akene or nut.

SHEPHERDIA (Lepargyrea)

BUFFALO-BERRY

Leaves petioled, simple, pinnately veined. Flowers small. Pistillate flowers 1 to few in a cluster: perianth-mouth nearly closed by an 8-lobed disk. Staminate flowers with 4-parted perianth: stamens 8. Fruit drupe-like, red (ours), with a nut or akene inside. (Honor of J. Shepherd, curator of the Liverpool Botanic Gardens.) W. C. E.
(*S. argentea* for our region.) *S. canadensis* Nutt. (Soap-olallee)

LYTHRACEAE

Loose-strife Family

Herbs (ours) or shrubs or trees; stem 4-angled. Leaves mostly opposite or alternate; stipules usually none. Flowers perfect, solitary or clustered. *Calyx* persistent, *free from the ovary but generally enclosing it*, toothed, often with smaller teeth in the notches. Petals as many as the calyx-teeth or none (not in ours), on the calyx. Stamens various in number, on the calyx. *Ovary* 1—6-celled; *style* 1; stigmas capitate or 2-lobed. Fruit a capsule, dehiscent or indehiscent. Seeds few to many.

A. Calyx-tube campanulate, 4-striate; leaves all opposite, not rounded at base.

B. Leaves linear-lanceolate, sessile, cordate-auricled and somewhat clasping at base; capsule bursting irregularly.

AMMANNIA (p. 259)

BB. Leaves oblong or linear-oblong, sessile or petioled, narrowed at base, not auricled nor clasping; capsule septicidal.

ROTALIA (p. 259)

AA. Calyx-tube cylindric, 8—12-striate; leaves alternate or the lower opposite, sessile, rounded at base, not clasping.

LYTHRUM (p. 260)

AMMANNIA

Annual, glabrous (ours) or glabrate. Leaves opposite, sessile, narrow, linear-lanceolate (ours), entire (ours). Flowers solitary or clustered, axillary. Calyx campanulate to globose, 4-angled, 4-toothed, often with other small teeth in the notches. Petals 4 (ours), deciduous. Stamens 4—8. Ovary enclosed in the calyx-tube, globose, 2—4-celled, bursting irregularly. (Honor of P. Ammann, a German botanist.) W. E.
(*A. latifolia*.) *A. coccinea* Rottb.

ROTALIA

Low, annual, mostly glabrous (ours so). Leaves sessile or sometimes petioled, opposite, linear or linear-oblong (ours), entire (ours). Flowers solitary, chiefly axillary, small. Calyx campanulate to globose, 4-lobed. Stamens 4. Capsule globose, enclosed

by the membranous calyx, 4-celled, septicidal. (Diminutive of *L. rota*=a wheel; referring to the whorled leaves of some species.) E. (*Ammannia humilis*.)

R. *ramosior* Koehne

LYTHRUM

· LOOSE-STRIFE

Annual (ours), or perennial. Leaves opposite or alternate or whorled (not ours), entire. Flowers solitary or cymose-paniculate or spicate, terminal or axillary (ours). Calyx-tube cylindric, 8—12-ribbed, straight; calyx-teeth 4—6, and 1 in each notch besides. Petals 4—6, rarely none (not ours). Stamens 8—12, on the calyx. Capsule oblong, membranous, 2-celled, 2-valved or bursting irregularly. Seeds many, flat or angular. (Gk. *lythron*=blood; perhaps on account of styptic properties.) W. (*L. adsurgens*.)

L. *hyssopifolia* L.

ONAGRACEAE Evening-primrose Family

Herbs (ours) or rarely shrubs, annual or biennial or perennial. Leaves simple, alternate or opposite; *stipules none* or mere glands. Flowers basal or axillary or spicate or racemose, perfect, regular or irregular. Calyx-tube adherent to the ovary, often prolonged beyond it; *calyx-limb* 2—6-lobed but *usually 4-lobed*. Petals 0—9 (ours 0 or 2 or 4), on top of calyx-tube. Stamens usually as many or twice as many as the sepals, on top of calyx-tube. *Ovary inferior*, 1—6-celled; style 1; stigma capitate or 4-lobed; cells 1- to many-ovuled. Fruit a capsule or nutlet. Seed mostly small.

A. Leaves opposite, not all basal.

B. Calyx-segments 2, petals 2, stamens 2; capsule obovate, leaves ovate to cordate. CIRCAEA (p. 269)

BB. Calyx-segments 4, petals 4, stamens 4 or 8; capsule mostly not obovate; leaves in most species narrow.

C. Stems procumbent or floating; leaves entire; stamens 4; capsules about 3 mm. long; calyx-segments persistent on the capsule; seeds not hairy.

LUDWIGIA (p. 261)

CC. Stems neither procumbent nor floating, erect to decumbent or caespitose; leaves often not entire; stamens 8; capsule 10 mm. or more long; calyx-segments deciduous from the capsule; seed long-hairy at one end. EPILOBIUM (p. 261)

AA. Leaves alternate or all basal.

D. Plants with evident stems.

E. Lower leaves often opposite; stamens 8; seed with a tuft of long hair at one end. EPILOBIUM (p. 261)

EE. Leaves all alternate; stamens 4 or 8; seed without a tuft of hair at one end.

F. Anthers versatile.

G. Stigma plainly 4-lobed or -cleft; leaves not entire.

H. Flowers axillary, white, becoming rose-colored in age; some species with pinnatifid leaves; capsule not nut-like, elongated, many-seeded; seeds in 1 row in each cell of the pod. ANOGRA (p. 266)

HH. Flowers in terminal spikes, yellow or rose-colored; no species with pinnatifid leaves.

I. Petals yellow, sometimes becoming pink in age, obcordate; capsule elongated, not nut-like, many-seeded; seeds in two rows in each cell.

ONAGRA (p. 265)

II. Petals rose-colored, spatulate; capsule oblong, nut-like, 1—4-seeded.

GAURA (p. 268)

GG. Stigma either 2-lobed or else capitate and not lobed; leaves entire or not.

J. Leaves lyrate-pinnate or pinnatifid. CHYLISMA (p. 267)

JJ. Leaves entire or denticulate.

K. Leaves denticulate or entire, linear or wider; calyx-tube prolonged beyond the ovary; ovary 4-celled. SPHAEROSTIGMA (p. 267)

KK. Leaves entire, linear; calyx-tube not prolonged beyond the ovary; ovary 2-celled. GAYOPHYTUM (p. 268)

FF. Anthers not versatile.

L. Fruit dehiscent by valves, elongated, not nut-like, many-seeded; leaves entire to dentate.

M. Calyx-lobes erect; petals 2-lobed, sessile. BOISDUVALIA (p. 264)

MM. Calyx-lobes reflexed; petals 3-lobed or entire.

N. Petals sessile, entire, rose or violet; leaves entire.

GODETIA (p. 264)

NN. Petals clawed, 3-lobed or entire, purple or violet; leaves entire to dentate.

CLARKIA (p. 264)

LL. Fruit indehiscent, nut-like, 1—2-seeded; stigma disk-like, entire; petals clawed; leaves entire.

HETEROGAURA (p. 268)

DD. Plants stemless or nearly so, the stems not over 3 cm. long.

O. Stigma capitate, entire or rarely with 4 shallow lobes; stamens of equal length; petals white or yellow; pod not winged.

TARAXIA (p. 266)

OO. Stigma deeply cleft into 4 linear lobes; outer 4 stamens longer than the inner 4; petals white or rose-colored.

P. Capsule not wing-angled; seed grooved on one side; leaves entire to pinnatifid.

PACHYLOPHUS (p. 266)

PP. Capsule wing-angled; seed not grooved; leaves pinnatifid.

LAVAUXIA (p. 266)

LUDWIGIA (Isnardia)

Annual (ours) or perennial; stem in ours glabrous, procumbent or floating, succulent, rooting at the nodes. Leaves alternate or opposite (ours), mostly entire (so in ours), sessile or petioled (ours); leaves in ours fleshy, oval to spatulate, 12—25 mm. long. Flowers axillary, sessile, greenish or yellowish or reddish (ours). Calyx-tube turbinate (ours); calyx-segments 3—5 (ours 4), persistent. Petals none or 4, inconspicuous. Stamens 4. Ovary 4(ours)—5-celled, very short; style almost none; stigma capitate or 4-lobed (ours). Capsule 4-angled (ours), septicidal (ours). Seeds many, in several rows. (Honor of C. G. Ludwig, a German botanist.) W. E.

L. palustris Ell. (Water Purslane)

EPILOBIUM

WILLOW-HERB

Annual or perennial. Leaves nearly sessile, entire or denticulate, often fascicled. Flowers white or rose-color or purple or yellow, racemose or paniculate. Calyx-tube not conspicuously prolonged beyond the ovary; calyx-limb deeply 4-lobed, campanulate or funnelform; lobes spreading, deciduous. Petals 4, spreading or somewhat erect. Stamens 8, 4 shorter. Stigma oblong, entire or 4-lobed. Capsule linear, 4-sided, 4-celled, 4-valved. Seeds many, with a tuft of hair at the summit. (Gk. epi=on, lobion=a little pod.)

A. Calyx-tube not extending beyond the ovary; flowers pink, 15 mm. or more wide.

CHAMAENERION (p. 262)

- AA. Calyx-tube extending beyond the ovary; flowers white or pink or yellow, often less than 15 mm. wide. LYSIMACHION (p. 262)

Subgenus CHAMAENERION—Corolla slightly irregular, widely spreading. Stigma 4-lobed.

- A. Stem 10—20 dm. high; leaves with a conspicuous vein along the margin; bracts small, not leaf-like; style pubescent at base. W. C. E. (*E. spicatum*; *Chamaenerion angustifolium*.) E. angustifolium L. (Fire-weed)
- AA. Stem 1.5—5 dm. high; leaves without vein along the margin; bracts large, leaf-like; style glabrous. W. C. E. (*Chamaenerion latifolium*.)
E. latifolium L.

Subgenus LYSIMACHION—Corolla regular, not more spreading than campanulate. Stigma entire to 4-lobed.

- A. Stigma deeply 4-lobed; flowers sometimes yellow. GROUP 1 (p. 262)
- AA. Stigma entire or merely notched; flowers white or pink. GROUP 2 (p. 262)

GROUP 1

- A. Flowers yellow or cream-color.
- B. Leaves broadly lanceolate or wider, 2.5—7.5 cm. long, glabrous; flowers bright yellow; petals 15—18 mm. long. W. C. E.
E. luteum Pursh (Yellow Willow-herb)
- BB. Leaves widely lanceolate, less than 2 cm. long, canescent; flowers cream-color; petals 5—8 mm. long. E.
E. suffruticosum Nutt. (Cream-colored Willow-herb)
- AA. Flowers white or pink.
- C. Plant 1—2 dm. high; leaves all entire or merely undulate.
- D. Leaves entire, 1.7—4 cm. long; petals 15—20 mm. long; stigma very rough with long papillae, its lobes twice as long as wide. U. (*E. rigidum canescens*.)
E. rigidum Haus.
- DD. Leaves undulate, 1.2—2 cm. long; petals 3—4 mm. long; stigma almost smooth, lobes very shallow, not as long as wide. W. C. E.
E. minutum Lindl.
- CC. Plant 3—12 dm. high; at least the lower leaves somewhat denticulate; petals 3—20 mm. long.
- E. Leaves closely denticulate, obtuse; capsule about 4 cm. long. U.
E. oreganum Gr.
- EE. Leaves entire or sparingly denticulate, or acuminate; capsule about 2 mm. long.
- F. Flowers 1—1.5 cm. wide. W. C. E.
E. paniculatum Nutt.
- FF. Flowers 2—4 cm. wide. U. E. (*E. hammondi*; *E. paniculatum jucundum*.)
E. jucundum Gray

GROUP 2

- A. Stems tall, 3—9 dm. high.
- B. Leaf-margin revolute; leaves sessile, nearly entire, linear-oblong. E.
E. palustre L.
- BB. Leaf-margin plane or involute.
- C. Annual; leaves lanceolate or linear-lanceolate.
- D. Branches many; leaves 2.5—5 cm. long, acute, sparingly denticulate; capsule about 2 cm. long. (See HH.)
- DD. Branches few; leaves 5—7.5 cm. long, obtuse, closely denticulate; capsule about 4 cm. long. U. E. oreganum Gr.

- CC. Perennial; leaves lanceolate to ovate.
 E. Petals 3—5 mm. long; plant not canescent-puberulent.
 F. Leaves sessile, plant almost simple. W. C. E. (*E. halleanum*; *E. brevistylum*.) *E. ovatifolium* Rydb.
 FF. Leaves abruptly and shortly wing-petioled; plant freely branched. W. C. E. (*E. adenocaulon occidentale*; *E. coloratum* for our region.)
E. adenocaulon Haus.
 FFF. Leaves or at least the upper gradually tapering to slender petioles; plant almost simple. E. (*E. adenocaulon perplexans*.)
E. perplexans Trel.
 EE. Petals 6—10 mm. long; plant canescent-puberulent. E.
E. franciscanum Barb.
 AA. Stems low, 1—3 dm. high; mostly alpine or subalpine species.
 G. Leaves all entire.
 H. Plant annual; stigma slightly 4-lobed; leaves 12—20 mm. long. W. C. E.
E. minutum Lindl.
 HH. Plant perennial; stigma slightly 2-lobed or entire.
 I. Seed papillate when seen under the microscope.
 J. Leaves glaucous. W. C. E. (*E. glaberrimum latifolium*; *E. glaberrimum*; *E. fastigiatum glaberrimum*.)
E. fastigiatum Pip.
 JJ. Leaves not glaucous.
 K. Leaves broadly ovate, spreading, not keeled. W. C. E.
E. clavatum Trel.
 KK. Leaves lanceolate, erect, keeled near the base. C. E. (*E. oregonense gracillimum*.)
E. pringleanum Haus.
 II. Seed smooth when seen under the microscope.
 L. Stem ascending, usually curved; leaves spreading, oval or oblong. W. C. E.
E. anagallidifolium Lam.
 LL. Stem erect; leaves ascending, linear or oblong-lanceolate. W. C. E.
E. oregonense Haus.
 GG. Some of the leaves denticulate or more coarsely notched.
 M. Stems branched.
 N. Pubescence of stem in lines; pedicels about as long as the capsules; seed 1 mm. long. W. C. (*E. leptocarpum macounii*.)
E. leptocarpum Haus.
 NN. Pubescence of stem not in lines; pedicels much shorter than the capsules; seed 2 mm. long. W. E. *mirabile* Trel.
 MM. Stems simple.
 O. Leaves less than 2.5 cm. long.
 P. Plant pilose-pubescent. U. C. E. (*E. ursinus subfalcatum*.)
E. ursinus Par.
 PP. Plant not pilose.
 Q. Leaves sessile, 1—1.6 cm. long; stem sparingly incurved-pubescent. W.
E. davuricum Fisch.
 QQ. Leaves petioled, 2—2.5 cm. long; stem glabrous except in the inflorescence. W. C. E.
E. hornmanni Reich.
 OO. Leaves more than 2.5 cm. long; petals white or pale rose-color.
 P. Leaves elliptic, petioled; seed smooth. W. C. E.
E. alpinum L.

RR. Leaves ovate-lanceolate or narrower; seed papillate.

S. Leaves petioled, obtuse, ovate-lanceolate, 5—7.5 cm. long, erect. W.

C. E. (*E. delicatum* for our region; *E. delicatulum tenue*.)

E. *delicatulum* Trel.

SS. Leaves sessile, acute, lanceolate to linear-lanceolate, 2.5—4 cm. long, spreading. C. E. *E. drummondii* Haus.

BOISDUVALIA

Annual, erect; stems leafy. Leaves alternate, sessile. Flowers small, in spikes; spikes leafy, simple or compound. Calyx-tube funnelform, deciduous; calyx-lobes erect. Petals 4, sessile, 2-lobed, white to purple. Stamens 8, those opposite the petals shorter. Ovary 4-celled; cells several-ovuled; stigma lobes short. Capsule membranous, ovate-oblong to linear, nearly terete, sessile, acute, dehiscent to base. Seeds ovate-oblong, smooth. (Honor of J. H. Bois Duval, a French naturalist.)

A. Upper leaves much wider than the lower ones; partitions of the capsule wholly adhering to the placenta in dehiscence; flowers often in numerous lateral spikelets. W. E. (*B. douglasii*; *B. densiflora pallescens*.)

B. *densiflora* Wats.

AA. Upper leaves not wider than the lower ones: partition of the capsule adhering to the valves in dehiscence; flowers in simple terminal spikes or solitary in the leaf-axils.

B. Leaves narrowly lanceolate, pubescent; capsule linear-acuminate, 8—12 mm. long, its cells 6—8-seeded. W. E. (Apparently *B. parviflora*; *B. torreyi*.)

B. *strictum* Gr.

BB. Leaves ovate-lanceolate, often glabrous; capsule ovate-oblong, 4—8 mm. long, its cells 4—6-seeded. E. B. *glabella* Walp.

CLARKIA

Annual, erect; stems brittle. Leaves alternate, entire (ours). Flowers showy, in terminal racemes. Calyx-tube obconic, deciduous; calyx-limb 4-cleft, reflexed. Petals 4, with claws, lobed or entire, purple or violet. Stamens 8, those opposite the petals often sterile or rudimentary. Ovary 4-celled; stigma 4-lobed. Capsule linear, attenuate above, coriaceous, erect, somewhat 4-angled, 4-celled and 4-valved to the middle. Seeds many. (Honor of W. Clarke, of the Lewis and Clarke expedition.)

A. Petals 3-lobed; their claws long; alternate stamens rudimentary; capsule 8-angled; pedicel 4—6 mm. long. E. C. *pulchella* Pursh

AA. Petals not lobed, entire; their claws short, wide; all stamens pollen-bearing; capsule 4-angled; pedicel 1—3 mm. long. C. E. (*Phacostoma rhomboidea*.)

C. *rhomboidea* Dougl.

GODETIA

FAREWELL-TO-SPRING

Annual; stems erect, simple or branched. Leaves alternate. Flowers showy, in racemes or spikes. Calyx-tube obconic or shortly funnelform, deciduous. Petals 4, wide, sessile, entire to 2-lobed, rose-color or lilac-purple. Stamens 8, unequal, the shorter ones opposite the petals. Ovary 4-celled, many-ovuled; style filiform; stigma-lobes short, linear or roundish. Capsule ovate to linear, 4-sided, somewhat coriaceous, loculicidal. Seeds many. (Honor of M. Godet, a Swiss botanist.)

A. Flowers in a narrow compact spike, erect in the bud; capsule ovate to oblong; seeds in 1 or 2 rows; leaves close together.

- B. Tips of the calyx-lobes not at all free in the bud; sides of the capsule not 2-ribbed; seeds in 2 rows in each cell. W.
G. purpurea Wats.
- BB. Tips of the calyx-lobes slightly free in the bud; capsule 2-ribbed at least on the alternate sides; seeds in one row in each cell.
- C. Flowers in a short simple spike. W. (*G. arnottii*; *G. decumbens*).
G. lepida Lindl.
- CC. Flowers in numerous short lateral spikeletes. W.
G. albescens Lindl.
- AA. Flowers in a loose spike or a raceme, nodding in the bud; capsule linear; seeds in 1 row; leaves distant.
- D. Capsule sessile; calyx-tips mostly free.
- E. Petals 6—12 mm. long.
- F. Ovary and capsule villous; capsule 2-ribbed at the alternate sides. W. E.
G. quadrivulnera Spach
- FF. Ovary and capsule puberulent; capsule nearly flat at the sides. U.
G. tenella Spach
- EE. Petals 18—30 mm. long. W. C.
G. viminea Spach
- DD. Capsules with pedicels; calyx-tips mostly not free.
- G. Petals 6—12 mm. long; pedicel of capsule 1—4 mm. long. W. E.
G. epilobioides Wats.
- GG. Petals 12—30 mm. long; pedicel of capsule 4—15 mm. long.
- H. Plant minutely puberulent; stem somewhat branched above.
- I. Anthers sparingly hairy, large, the terminal part sterile and often hooked.
W.
G. caurina Abrams
- II. Anthers glabrous, small, fertile to the tips. W. C. E.
G. amoena Lilja (Herald-of-summer)
- HH. Plant hispid with short spreading hairs; stem simple. W.
G. hispidula Wats.

ONAGRA

EVENING PRIMROSE

Annual or biennial; stems 3—15 dm. high (ours), coarse. Leaves alternate. Flowers yellow, changing to pink in age, nocturnal, erect before opening. Calyx-tube more or less prolonged above the ovary, deciduous; calyx-segments 4, reflexed. Petals 4, equal, sessile, obcordate to obovate. Stamens 8, equal; anthers versatile. Stigma deeply 4-cleft. Seeds in 2 or rarely more rows, prismatic-angled. (Said to be from *Gk. onagros*—the wild ass, whose ears the leaves resemble.)

- A. Petals 1—2 cm. long; calyx-lobes shorter than the calyx-tube. W. E. (*Oenothera biennis strigosa*).
A. strigosa Rydb.
- AA. Petals 2.5—4 cm. long.
- B. Calyx-lobes nearly glabrous, shorter than the calyx-tube; annual, erect. E.
A. macbrideae Nels.
- BB. Calyx-lobes densely hairy, as long as or longer than the calyx-tube; biennial.
- C. Flowers yellow or purplish, drying lighter; stems erect. W. E. (*O. muricata* and *Oenothera biennis muricata* for our region.)
A. hookeri Small
- CC. Flowers yellow, drying darker; stems spreading. E.
A. ornata Nels.

ANOGR

WHITE EVENING PRIMROSE

Annual or perennial; stems present, often with papery bark, somewhat woody. Leaves alternate, sometimes pinnatifid. Flowers diurnal, axillary, white, becoming rose-color in age, nodding in bud. Calyx-tube prolonged above the ovary, deciduous; calyx-segments 4, narrow. Stamens 8, unequal; anthers versatile. Ovary slender; stigma deeply 4-cleft. Capsule elongated, spreading or ascending, loculicidal. Seeds many; in 1 row in each cell. (An anagram of *Onagra*.)

A. Calyx villous or densely strigose; at least some of the leaves deeply pinnatifid. E.

A. trichocalyx Small

AA. Calyx glabrate or sparsely hairy; leaves entire to merely short-lobed.

B. Leaves glabrous; capsules divaricate, usually some of them contorted or twisted. E.

A. pallida Brit.

BB. Leaves pubescent beneath; capsules ascending, straight. E.

A. nuttallii Nels.

PACHYLOPHUS

STEMLESS EVENING PRIMROSE

Herbs. Perennial; stems none or very short. Leaves entire to pinnatifid. Flowers large, white or rose-colored, opening only at night or in cloudy weather. Calyx-tube elongated, somewhat dilated at the throat; calyx-limb 4-parted, erect in the bud. Petals 4, sessile, white, but changing to red in age. Stamens 8, unequal; anthers basifixed. Capsule ovate or ovate-oblong, large and rigid, sharply or obtusely 4-angled, mostly sessile. Seeds in 1 or 2 rows, large, with a deep groove along one side. (Gk. pachys=thick, lophia=a crest; referring to the warty edges of the capsule.)

A. Plant wholly glabrous thruout; petals 2—4 cm. long. E. (*P. nuttallii*.)

P. caespitosus Raim.

AA. Plant more or less pubescent or hairy; petals 4—6 cm. long.

B. Leaves green, glabrous except for the villous margin. E.

P. marginatus Rydb.

BB. Leaves canescent-puberulent on both sides. E.

P. canescens Pip.

LAVAUZIA

Perennial or annual, low, stems none or rarely present. Leaves mostly basal, pinnatifid, many, 7.5—30 cm. long (ours), petioled (ours). Flowers perfect, white or pink or yellow (not ours), 2.5—6 cm. wide (ours). Calyx-tube slender, 5—10 cm. long (ours), dilated at the throat; calyx-segments 4, finely reflexed. Petals 4, spreading, in ours often 3-lobed. Stamens 8, 4 longer; anthers versatile. Ovary short, 4-angled; stigma 4-cleft. Capsule stout; in ours ovoid, with 4 wing-angles, 1.2—2.5 cm. long. Seeds few, not grooved. (Honor of F. Delavaux, the founder of a French botanical garden.) E.

L. trilobata Spach (3-lobed Primrose)

TARAXIA

Annual or perennial; stemless. Leaves entire to pinnatifid. Flowers white or yellow, axillary. Calyx-limb 4-parted; calyx-tube filiform, longer than the ovary, marcescent or tardily deciduous. Petals 4, deciduous. Stamens 8, erect; anthers basifixed or versatile. Style usually adherent to the calyx-tube; stigma capitate, entire or 4-toothed. Capsule sessile. Seeds in 2 rows in each cell. (Gk. taraxis=trouble or confusion; apparently a puzzling genus.)

- A. Leaves deeply pinnatifid.
 - B. Plant white-pubescent. E. (*T. tanacetifolia*; *T. longiflora*.)
T. breviflora Nutt.
 - BB. Plants glabrous or nearly so. E.
T. heterantha taraxacifolia Small
 - AA. Leaves entire to repand-denticulate.
 - C. Plant perennial, glabrous or somewhat pubescent; leaves oblong-lanceolate.
 - D. Plant glabrous; leaves oblong-lanceolate; capsule 1.5—2 cm. long; seeds many. E. (*T. subacaulis*.)
T. heterantha Small
 - DD. Plant somewhat pubescent; leaves ovate to oblong-lanceolate; capsule 1.2 cm. long; seeds few. E. *T. ovata* Small
 - CC. Plant annual, villous; leaves linear. E.
T. gracilliflora Raim.

SPHAEROSTIGMA

Annual or perennial; stems present. Leaves alternate, entire or denticulate or pinnatifid (not ours). Flowers solitary or in spikes, white or rose-colored or yellow. Calyx-tube obconic or shortly funnelform; calyx-segments 4, reflexed. Petals 4, entire or emarginate. Stamens 8, somewhat unequal. Stigma capitate, entire. Capsule linear or elongated, sessile or stalked, terete or 4-angled, straight or contorted, 4-celled. Seeds in 1 row in each cell, ovate to linear-oblong, smooth or nearly so. (Gk. *sphaira*= sphere, +stigma; because the stigma is capitate.)

- A. Flowers yellow or yellowish, sometimes turning red or green, axillary in most species.
 - B. Capsule linear, more or less contorted.
 - C. Stem glabrous; leaves 6—18 mm. long, linear to lanceolate; petals 2—4 mm. long; capsule 16—27 mm. long. W. E. (*S. contorta pubens*; *S. contorta greeni*.)
S. contorta Walp.
 - CC. Stems not glabrous; leaves longer, often wider; petals 6—8 mm. long.
 - D. Stem puberulent; capsule 20—25 mm. long. E.
S. implexa Nels.
 - DD. Stem pubescent; capsule 8—16 mm. long. U.
S. spirale Walp.
 - BB. Capsule attenuate upward from a wider base, straight.
 - E. Seeds pale, linear; flowers barely 2 mm. long. E.
S. andinum Walp.
 - EE. Seeds dark, obovate, clavate; flowers 2—4 mm. long. E.
S. hilgardi Small
 - AA. Flowers white or rose-color, in nodding spikes.
 - F. Leaves oblanceolate, 2.5—7.5 cm. long. E. (*S. alyssoides* for our region; *S. alyssoides minutiflorum*; *S. minutiflorum*.)
S. tortum Nels.
 - FF. Leaves ovate, 1.2—2.5 cm. long. E.
S. boothii Walp.

CHYLISMA

Annual; stems present. Leaves simple or pinnate. Flowers yellow or rose-colored, in terminal racemes. Calyx-tube funnelform or obconic; calyx-segments 4. Petals 4, entire. Stamens 8, unequal. Stigma capitate, entire. Capsule linear, subcylindric or

subclavate, obtuse, membranous, not sessile. Seeds in 1 row in each cell. (Probably Gk. chylos=plant juice. Why?)

A. Flowers yellow; calyx-tube 2—4 mm. long; petals 4—6 mm. long. E.

C. scapoidea Small

AA. Flowers rose-colored; calyx-tube 4—6 mm. long; petals 6—8 mm. long. E.

C. cruciformis How.

GAYOPHYTUM

Annual; stem branched, very slender. Leaves entire, linear. Flowers axillary. Calyx-tube not produced beyond the ovary; calyx-segments 4, deciduous, reflexed. Petals 4, white or rose-colored, very small, ovate or oval, very short-clawed. Stamens 8, 4 shorter and usually sterile; anthers attached by the middle. Ovary 2-celled; stigma capitate or clavate. Capsule membranous, clavate, 2-celled, 4-valved. Seeds few to many, in 1 row in each cell, oblong, smooth. (Probably Gk. gaios=on land, phyton=plant.)

A. Seed hairy.

B. Stems 2—3 dm. high; petals about 2 mm. long; pod scarcely torulose. C. E.

G. lasiospermum Gr.

BB. Stems 3—5 dm. high; petals 6—8 mm. long; pod torulose. E.

G. eriospermum Cov.

AA. Seed glabrous.

C. Capsule nearly sessile; branches nearly all from near the base of the stem. C. E.
(*G. pumilum*; *G. caesium*.)

G. racemosum T. & G.

CC. Capsules on elongated pedicels; branches mostly from the upper part of the stem.

D. Flowers 5—12 mm. wide. E.

G. diffusum T. & G.

DD. Flowers 2—4 mm. wide. C. E.

G. ramosissimum T. & G.

GAURA

Annual or biennial or perennial; stems somewhat woody at base in ours; 6—15 dm. high, villous-pubescent with whitish hairs. Leaves alternate, sessile, narrow; leaves in ours ovate-lanceolate, acute or acuminate, repand-denticulate, barely petioled, soft-pubescent. Flowers white or pink (ours) or red, in terminal spikes (ours) or racemes. Calyx usually pubescent; calyx-tube narrow, prolonged beyond the ovary, deciduous; calyx-lobes 3—4 (ours 4). Petals 3—4 (ours 4), unequal. Stamens usually 8. Ovary 1-celled; stigma 4-lobed, surrounded by a cup-like border. Fruit nut-like, ribbed or angled, indehiscent or nearly so. Seeds 1—4, unappendaged. (Gk. gauros=superb; some species have rather fine flowers.) E.

G. parviflora Dougl. (Small-flowered Gaura)

HETEROGAURA

Annual; stems 3—4.5 dm. high (ours). Leaves alternate; in ours entire, lanceolate, petioled, 2.5—5 cm. long. Flowers small, in terminal racemes. Calyx-tube obconic; calyx-segments 4, spreading, deciduous. Petals 4, entire, clawed; in ours purple, 4 mm. long. Stamens 8, 4 shorter. Ovary 4-celled; cells 1-ovuled; stigma disk-like, entire. Fruit nut-like, indehiscent, obovoid, 2—4-celled, 1—2-seeded. (Gk. heteros=unlike or different, + *Gaura*.) U. *H. californica* Rothr.

CIRCAEA

ENCHANTER'S NIGHTSHADE

Perennial, low. Leaves thin, opposite, petioled. Flowers small, white, in terminal and lateral racemes. Calyx-tube slightly projecting beyond the ovary, deciduous; calyx-lobes 2, reflexed. Petals 2, obcordate. Stamens 2, alternate with the petals. Stigma somewhat capitate. Fruit a capsule, small, obovoid, densely hispid with hooked hairs, indehiscent; cells 1—2 (ours 1), 1-seeded. (Honor of Circe, a Greek enchantress, who is said to have used these plants.)

A. Leaves dentate; racemes with minute setaceous bracts subtending the pedicels. W. C. E.
C. E. C. alpina L.

AA. Leaves undulate-denticulate; racemes bractless. W. C. E.
C. pacifica Asch.

HALORAGIDACEAE Water-milfoil Family

Herbs, annual or perennial, glabrous, aquatic (ours) or in mud. Leaves whorled (some so in all of ours) or alternate, the submerged ones often pectinate-pinnatifid. Flowers perfect or monoicous or dioicous, axillary or in terminal spikes, solitary or clustered in the axils. Calyx entire or 2—4-lobed. Petals none or 2—4, small. Stamens 1—8. Ovary inferior, ovoid-oblong or short-cylindric, 2—8-ribbed or -winged, 1—4-celled; styles 1—4. Fruit a nutlet or drupe, flattish, angular, ribbed or winged, indehiscent; carpels 1-seeded.

A. Submerged leaves pinnatifid into capillary segments, 3—5 in a whorl or rarely some scattered; stem not *Equisetum*-like; stamens 4—8; ovary 2—4-celled.

MYRIOPHYLLUM (p. 269)

AA. All leaves linear or wider, simple, entire, 4—12 in a whorl; stem conspicuously jointed and somewhat *Equisetum*-like; stamen 1; ovary 1-celled. HIPPURIS (p. 270)

MYRIOPHYLLUM

WATER MILFOIL

Submerged leaves pinnatifid into capillary segments. Flowers axillary, 2-bracted, usually monoicous, often interruptedly spicate. Upper flowers usually staminate: calyx-tube none or very short; calyx-limb 2—4-lobed; petals 2—4; stamens 4—8. Intermediate flowers often perfect. Lower flowers pistillate: calyx none or somewhat 4-grooved, minutely 4-lobed; ovary 2—4-celled; ovule 1 in each cell; styles 4, often plumose. Fruit splitting into 4 carpels; carpels bony, indehiscent, 1-seeded, smooth or angled or tubercled on the back. (Gk. myrios=numberless, phyllon=leaf; the leaves are split into very many segments.)

A. Floral leaves shorter or very little longer than the flowers.

B. Floral leaves entire or merely dentate; rachis and segments of the foliage leaves capillary and of about the same diameter. W. E.

M. spicatum L.

BB. Floral leaves pectinate; rachis of the foliage leaves flattish and somewhat wider than the segments. W. E. (*M. verticillatum* for our region.)

M. verticillatum pectinatum Wallr.

AA. Floral leaves many times as long as the flowers.

C. Foliage leaves in whorls of 4—6; carpels smoothish. W. E.

M. hippuroides Nutt.

CC. Foliage leaves variously arranged, on the same stem in whorls of 3—5 or scattered; carpels with 2 tuberculate ridges on the back. W.

M. pinnatum B. S. P.

HIPPURIS

MARE'S TAIL

Stem simple, erect; in ours jointed, 5—60 cm. high. Leaves whorled, entire, simple; in ours sessile, linear to obovate or ovate, 1—7 cm. long, 4—12 in a whorl. Flowers small, axillary, perfect or sometimes neutral or pistillate. Calyx-limb minute, entire. Petals none. Stamen 1, on the calyx. Style filiform, lying in a groove of the anther. Fruit a drupe, small, 1-celled, 1-seeded. (Gk. hippos=a horse, oura=a tail; from the resemblance of the leafy stem.) W. C. E. (*H. tetraphylla*; *H. montana*; *H. vulgaris fluvialis*.)
H. vulgaris L.

ARALIACEAE

Ginseng Family

Herbs or shrubs or trees (not ours), perennial (ours). Leaves alternate or whorled or opposite (not ours). Flowers perfect or polygamous, in umbels or heads (not ours) or racemes or panicles. Calyx-limb truncate or toothed or none. Petals usually 5, sometimes cohering, on margin of calyx. (Stamens as many as the petals and alternate with them, rarely more, on the epigynous disk; anthers introrse. Ovary inferior or rarely superior, 1- to several-celled; styles as many as the cells of the ovary; ovule 1 in each cell. Fruit a berry or drupe. Seed flattish or somewhat 3-angled.

A. Shrubs, erect or decumbent or vining; leaves simple.

B. Erect or decumbent, not vining, very prickly; twigs 1—2.5 cm. thick; leaves deciduous, prickly, 15—50 cm. long. FATSIA (p. 270)

BB. Vining, climbing by roots from the vines; not prickly; twigs smaller; leaves evergreen, smooth, 3—15 cm. long. HEDERA (p. 270)

AA. Herbs, erect or stemless; leaves compound.

C. Leaves many and not whorled or else only 1, pinnate or ternate, usually 2-compound; leaflets usually more than 5; fruit not red. ARALIA (p. 271)

CC. Leaves 3 in a whorl, palmate, 1-compound; leaflets usually 5; fruit red. PANAX (p. 271)

FATSIA (*Echinopanax*)

DEVIL'S CLUB

Shrubs, smooth or densely prickly (ours), very little branched, ours 1—9 m. high. Twigs in ours 15—25 mm. thick. Leaves large, palmately lobed, palmately veined; leaves in ours alternate, simple, roundish-cordate, deciduous, prickly, 15—50 cm. long. Flowers perfect or polygamous, greenish-white, in umbels; umbels dense, paniculate, terminal, numerous. Calyx-limb narrow or none. Petals 5. Styles 2—3. Fruit drupe-like, flattened, red in ours. (The Japanese common name for one of the species.) W. C. E.

F. horrida B. & H.

HEDERA

ENGLISH IVY

Shrubs, vining, climbing walls and trees by means of roots from the stem. Leaves simple, alternate, coriaceous, evergreen, glossy, those of the sterile shoots kidney- or heart-shaped, 3—7-lobed or -angled, those of the flowering shoots lanceolate to oval and unlobed. Flowers yellowish-green. Calyx with 5 small teeth. Petals 5. Ovary superior to inferior; styles 5. Fruit berry-like, 5-seeded, sometimes 3—4-seeded, black (ours) or yellowish, cultivated; occasionally persisting about former dwelling places. (Celtic hedra=a cord; from the vining stems.) W.

H. helix L.

ARALIA

Herbs (ours) or shrubs or trees. Leaves alternate, pinnately or ternately compound (ours 1—2-compound); petioles sheathing at base; stipules none or inconspicuous. Flowers small, mostly perfect, in racemose or paniculate or corymbose umbels, white or greenish; pedicels jointed below the flowers. Calyx truncate or 5-toothed. Petals 5, spreading, obtuse or with short reflexed points. Styles 5. Fruit a small berry. Seeds about 5. (Origin?)

A. Plant stemless or nearly so; leaf 1, ternate and each division ternately or pinnately 3—5-foliolate; umbels commonly 3, simple, not involucre. E.

A. nudicaulis L. (Wild Sarsaparilla)

AA. Plant with stem 2—3 m. high; leaves many, 1—2-pinnate; umbels many, in panicles or racemes which are 3—6 dm. long, involucre. C. (*A. californica acuminata*.)

A. californica Wats. (California Spikenard)

PANAX

GINSENG

Herbs, erect; roots globose or elongated, aromatic; stems 2—4 dm. high (ours). Leaves 3, in a whorl at the top of the stem, palmately compound, 3—7-foliolate, ours usually 5-foliolate. Flowers in an umbel; umbel terminal, simple, greenish or white, polygamous. Calyx-limb obscurely 5-toothed. Petals 5, spreading. Styles 2—3. Fruit a small berry, drupe-like, somewhat flattish, bright-crimson (ours), enclosing 2—3 seeds. Cultivated; reported escaped. (Gk. pan=all, akos=a cure; hence a cure-all or panacea, from its reputed medicinal properties.) W.

P. quinquefolium L. (Ginseng)

UMBELLACEAE (Apiaceae)* Carrot Family

Herbs. Stems often hollow. *Leaves* simple to compound, *alternate*; petiole often dilated at base; stipules none or rarely minute. *Flowers* small, white or yellow or green or blue or purple, *usually in umbels*, rarely in heads or head-like clusters, often polygamous; umbels simple or compound, usually involucre; umbellets usually with an involucre. *Calyx-limb none or 5-lobed; lobes inconspicuous.* *Petals* 5, on the calyx, those of the outer flowers sometimes larger than the inner. *Stamens* 5, on the epigynous disk; *anthers versatile.* *Ovary inferior, 2-celled; styles* 2, filiform, distinct, persistent, often on a conic or depressed stylopodium; cells 1-ovuled. *Fruit* dry; *carpels* 2, 1-seeded, with 0 or 5 chief ribs, sometimes with 4 other smaller ribs, usually separating at maturity along their plane of union (commissure), after separation borne on a slender axis (carpophore); ribs often winged; oil-tubes usually contained in the intervals between the 5 primary ribs, or under the ribs, and on the commissure side, sometimes irregularly scattered, sometimes none. Seed flat or concave on 1 side.

A. Leaves simple.

B. Leaves awl-shaped to lanceolate or oblanceolate or oblong.

C. Leaves entire; flowers white or yellow, in umbels. GROUP 3, BB (p. 273)

CC. Leaves lobed to dentate; flowers white or blue, in dense somewhat spiny heads.

GROUP 1, A (p. 272)

*This difficult family depends upon the oil-tubes in the fruit for the separation of the genera. To see these cut a thin cross section of a carpel with a sharp knife and examine with the low power of the compound microscope. The oil-tubes are just outside the seed-cavity.

- BB. Leaves ovate to orbicular or kidney-shaped.
 - D. Marsh- or water-plants; leaves kidney-shaped, wider than long; umbel simple. GROUP 3, B (p. 273)
 - DD. Not marsh- nor water-plants; leaves ovate or longer, at least longer than wide; umbel compound. GROUP 1, B (p. 272)
- AA. Leaves compound or very deeply dissected.
 - E. Fruit conspicuously bristly or scaly. GROUP 1 (p. 272)
 - EE. Fruit not bristly nor scaly.
 - F. Fruit strongly flattened dorsally; lateral ribs more or less prominently winged. GROUP 2 (p. 272)
 - FF. Fruit not strongly flattened dorsally, usually somewhat flattened laterally.
 - G. Oil-tube 0—1 in each interval. GROUP 3 (p. 273)
 - GG. Oil-tubes more than 1 in each interval. GROUP 4 (p. 274)

GROUP 1

- A. Flowers in dense bracted prickly heads. ERYNGIUM (p. 275)
- AA. Flowers in compound umbels, the umbellets often in head-like clusters, but then not or hardly bracted.
 - B. Fruit covered with hooked bristles; leaves merely coarsely lobed or 1-compound. SANICULA (p. 275)
 - BB. Fruit with bristles only on the ribs; leaves finely dissected or more than 1-compound.
 - C. Bristles of the fruit barbed with arrow-head-like tips; stylopodium none. DAUCUS (p. 289)
 - CC. Bristles of the fruit not barbed, or merely hooked by the curved tip; stylopodium conical or short.
 - D. Calyx-lobes prominent; fruit ovate or oblong; oil-tube 1 in each interval; leaves pinnately dissected into small narrow divisions. CAUCALIS (p. 276)
 - DD. Calyx-lobes none; fruit linear-oblong or linear; oil-tubes none or numerous; leaves ternately decompound; leaflets wide, ovate, toothed. WASHINGTONIA (p. 276)

GROUP 2

- A. Oil-tube 1 in each interval.
 - B. Plant with a leafy stem.
 - C. Flowers greenish or white or purplish.
 - D. Plant either slender or else pubescent at least in the umbels; stylopodium conic.
 - E. Plant slender, glabrous; fruit glabrous. OXYPOLIS (p. 285)
 - EE. Plant stout, pubescent at least in the umbels; fruit hairy.
 - F. Leaves 1—2-pinnate; leaflets oblong to linear-lanceolate, 2.5—5 cm. long. SPHENOSCIADIUM (p. 280)
 - FF. Leaves large, ternate; leaflets round-cordate, 10—25 cm. long. HERACLEUM (p. 289)
 - DD. Plant stout and glabrous; stylopodium flat or none. ANGELICA (p. 282)
 - CC. Flowers yellow. PASTINACA (p. 289)
 - BB. Leafy stem none or almost none. LOMATIUM (p. 286)
 - AA. Oil-tubes more than 1 in each interval.
 - G. Stem leafy, branching.
 - H. Leaves ternately or pinnately 1—3-compound. ANGELICA (p. 282)
 - HH. Leaves many times compound. CONIOSELINUM (p. 282)
 - GG. Stem none or leafless and unbranched.
 - I. Lateral wings of the fruit thin.

- ### GROUP 3

- GROUP 5
- A. Leaves simple.
- B. Leaves kidney-shaped, 3—7-lobed and somewhat crenate. HYDROCOTYLE (p. 274)
- BB. Leaves linear to oblong, entire.
- C. Leaves awl-shaped, hollow, with cross-partitions; flowers white; umbel simple. LILAEOPSIS (p. 280)
- CC. Leaves linear to lanceolate, not hollow, without cross-partitions; flowers yellow; umbel compound. BUPLEURUM (p. 277)
- AA. Leaves compound or very nearly so.
- D. Oil-tubes none; carpels smooth, linear.
- E. Fruit acutely ribbed. WASHINGTONIA (p. 276)
- EE. Fruit not ribbed except at the beak. ANTHRICUS (p. 276)
- DD. Oil-tube 1 at the base of each groove.
- F. Flowers white or rose-color.
- G. Stylopodium conic.
- H. At least the upper leaflets linear or filiform.
- I. Involucre none; leaflets flabelliform or the upper leaves merely cleft. CORIANDRUM (p. 276)
- II. Involucre present; leaflets dissected into filiform divisions. CARUM (p. 279)
- HH. Leaflets wider than linear.
- J. Involucre-bracts few or none. CICUTA (p. 278)
- JJ. Involucre-bracts conspicuous. TAENIOPLEURUM (p. 278)
- GG. Stylopodium flat or none.
- K. At least the lateral ribs thick and corky.
- L. Plants in water or very wet places; dorsal ribs of the carpels filiform. OENANTHE (p. 280)
- LL. Plants of rather dry soil; dorsal ribs of the carpels prominent and corky.
- M. Ribs of the carpels much wrinkled when old; involucre none; fruit 3 mm. long. RHYSOPTERUS (p. 284)
- MM. Ribs of the carpels not wrinkled; involucre present; fruit not over 2 mm. long. AMMI (p. 278)
- KK. Ribs obscure or none. LEIBERGIA (p. 279)
- FF. Flowers yellow; stylopodium flat or none.

N. Ribs of the carpels conspicuously winged.

THASPIUM (p. 282)

NN. Ribs of the carpels filiform.

ZIZIA (p. 278)

GROUP 4

A. Stylopodium conic.

B. Fruit round; carpels globose; carpel-ribs very slender, inconspicuous.

BERULA (p. 280)

BB. Fruit ovate or oblong.

C. Ribs of the carpels prominent, equal.

D. Umbel 15—25-rayed; fruit oblong to ovate; carpels flattened laterally if at all.

LIGUSTICUM (p. 280)

DD. Umbel 5—12-rayed; fruit oblong to linear; carpels slightly flattened dorsally if at all.

WASHINGTONIA (p. 276)

CC. Ribs of the carpels filiform or almost none.

EULOPHUS (p. 279)

AA. Stylopodium flat or none.

E. Seed-face sulcate or decidedly concave.

F. Carpels flattened dorsally.

AULOSPERMUM (p. 284)

FF. Carpels terete.

DRUDEOPHYTUM (p. 277)

EE. Seed-face plane or but slightly concave.

G. All of the ribs of the carpels conspicuously winged.

H. Plants of the seashore, tomentose; wings of the carpels corky-thickened.

GLEHNIA (p. 283)

HH. Plants of mountains and plains, glabrous or merely pubescent; wings of the carpels thin.

I. Leaves pinnate; leaf-segments short, crowded, more or less confluent; flowers purple or pinkish.

PHELLOPTERUS (p. 283)

II. Leaves ternate and then pinnate; leaf-segments short, linear, more or less hard-tipped; flowers yellow or white.

PTERYXIA (p. 283)

GG. Ribs of the carpels not winged.

J. Stem-leaves simple, entire, clasping or perfoliate.

BUPLEURUM (p. 277)

JJ. Stem-leaves none or not as above.

K. Flowers yellow; carpels-ribs all filiform; plant without leafy stem.

HESPEROGENIA (p. 277)

KK. Flowers white or greenish; at least the lateral carpel-ribs corky.

L. Stem 3 dm. or less high; lateral carpel-ribs thick and corky, the dorsal filiform.

OROGENIA (p. 277)

LL. Stem 6 or more dm. high; all the carpel-ribs corky and equally prominent.

M. Calyx-teeth minute; fruit flattened laterally; leaves pinnate.

SIUM (p. 279)

MM. Calyx-teeth none; fruit not or hardly flattened either way; leaves 2—3-ternate.

COELOPLEURUM (p. 281)

HYDROCOTYLE

WATER PENNYWORT

Perennial, low, in or near water; stem slender, creeping, rooting from the nodes (ours). Leaves orbicular-peltate or reniform (ours); in ours 3—7-cleft, the lobes crenate. Flowers small, white; umbels in ours simple, 5—10-flowered; involucre none. Calyx-teeth none or minute. Petals entire. Fruit more or less orbicular, strongly flattened laterally; carpels 5-ribbed; oil-tubes none or small. (Gk. hydor=water, kotyle= a flat cup; some species have somewhat cup-shaped peltate leaves.) W.

H. ranunculoides L.

SANICULA

SANICLE

Plants glabrous; stems few-leaved or almost naked. Leaves palmately or pinnately veined, lobed to compound; lobes or leaflets more or less pinnatifid or incised. Flowers greenish-yellow or purple; umbels few-rayed, compound, irregular; umbellets globose and somewhat head-like. Calyx-lobes somewhat foliaceous, persistent. Petals obovate or narrower, emarginate. Fruit subglobose, tuberculate or bristly; bristles hooked; carpels not ribbed; stylopodium depressed; oil-tubes mostly 3 on the back and 2 on the edges of the commissure sides, sometimes 3—19 irregularly distributed. (L. sanare—to heal; because a common European species is vulnerary.)

A. Leaves pinnately segmented or lobed. W.

S. pinnatifida Dougl.

AA. Leaves ternately or palmately segmented or lobed.

B. Mature fruit pedicelled or stipitate.

C. Involucre-bracts 2—3, small; involucre-bracts 6—8, small; fruit bristly all over. W. E.

S. menziesii H. & A.

CC. Involucre-bracts 1—2, large; involucre-bracts 8—12, exceeding the flowers; fruit naked at base, bristly above. W.

S. arctopoides H. & A.

BB. Mature fruit neither pedicelled nor stipitate.

D. Leaves with the main divisions confluent at base.

E. Involucels of prominent bractlets, sometimes exceeding the head of fruit. W.

S. howellii C. & R.

EE. Involucels of small bractlets.

F. Leaves 3-lobed to 7-parted; fruit 3 mm. long including the bristles. W.

S. laciniata H. & A.

FF. Leaves 5- or 7-parted; fruit 6—7 mm. long including the bristles. E.

S. marylandica L. (Black Snakeroot)

DD. Leaves with the main divisions distinct at base. W. C. E. (*S. nevadensis* for our region.)

S. septentrionalis Gr.

ERYNGIUM

ERYNGO

Perennial, glabrous. Leaves coriaceous, rigid, spiny-toothed or lobed or dentate or sometimes dissected (not ours) or rarely entire. Flowers white or blue, sessile, in heads; heads dense, bracted. Calyx-teeth rigid, prickly-pointed. Petals emarginate. Fruit obovoid or ovoid, scaly or tubercled, somewhat flattened laterally. Carpels nearly terete, not or hardly ribbed; oil-tubes usually 5. (Said to be from Gk. erygein—to belch; some were thought a remedy for flatulency.)

A. Styles shorter than the sepals.

B. Bractlets little longer than the heads; heads usually blue. W. E. (*E. harknessii*.)

E. articulatum Hook.

BB. Bractlets twice as long as the heads; heads green. W.

E. petiolatum Hook.

AA. Styles longer than the sepals.

C. Bractlets but little longer than the flowers; bracts somewhat scarious-margined at base. E.

E. alismaefolium Gr.

CC. Bractlets much longer than the flowers; bracts not at all scarious-margined. E.

E. vaseyi C. & R.

ANTHRISCUS

BEAKED PARSLEY

Annual (ours) or biennial. Leaves ternately or pinnately decompose. Flowers white; involucre usually none; umbels compound; involucel bracts numerous. Calyx-lobes none or minute. Fruit linear (ours), beaked, laterally flattened, smooth (ours); carpels nearly terete; ribs none except at the beak; stylopodium conic or depressed; oil-tubes none. E. (Latin name.) *A. cerefolium* Hoffm.

WASHINGTONIA (Osmorhiza)

SWEET CICELY

Perennial, glabrous to hirsute; roots thick, aromatic; stems 3—9 dm. high. Leaves ternately decompose; leaflets wide-ovate to lanceolate, narrowly toothed. Flowers white or purple; involucre and involucels few-leaved or none; umbels few-rayed, few-fruited. Calyx-teeth none. Fruit linear to linear-oblong, glabrous or bristly on the ribs, club-shaped; carpels slightly flattened dorsally or not at all, often long-tailed at base, ribs equal; oil-tubes often many in young fruit but disappearing in age. (Honor of G. Washington, the first President.)

A. Fruit with bristly ribs; carpels with long caudate attenuation.

B. Flowers white.

C. Fruit obtuse at apex; foliage almost glabrous. E. (*O. nuda* for our region.)
W. obtusa C. & R.

CC. Fruit beaked or constricted at apex.

D. Foliage almost glabrous.

E. Fruit with a conspicuous sharp beak. *W. C. E.*
W. divaricata Brit.

EE. Fruit constricted below the apex and with a truncate beak. *W. C. E.*
W. leibergi C. & R.

DD. Foliage strigose-pubescent. *W. C. E.*
W. brevipes C. & R.

BB. Flowers purple. *W. C. W. purpurea* C. & R.

AA. Fruit glabrous; carpels without caudate attenuation, mostly obtuse at base.

F. Rays erect in fruit, forming a compact cluster of fruits. E. (*Glycosma occidentalis*.)
W. occidentalis C. & R.

FF. Rays spreading in fruit, forming a loose umbel. U. C. E. (*Glycosma ambiguum*.)
W. ambigua C. & R.

CAUCALIS

HEDGE-PARSLEY

Annual, mostly hispid but ours nearly glabrous. Leaves pinnately dissected or decompose. Flowers white or reddish; umbels compound, in ours at the ends of the stem and branches and very unequally 3—6-rayed; in ours involucre-bracts foliaceous, divided; involucel-bracts several or numerous, narrow. Calyx-teeth prominent, acute. Petals cuneate or obovate, mostly 2-lobed. Fruit ovoid or oblong, laterally flattened; stylopodium thick, conic; primary ribs 5, filiform; secondary ribs 4, winged, each with a row of barbed or hooked (ours) bristles or tubercles; oil-tubes 1 in each interval, 2 on the commissure side. (The Greek name was *kaukalis*.) *W. E.*

C. microcarpa H. & A.

CORIANDRUM

CORIANDER

Annual, glabrous, slender, branching. Leaves pinnately compound; in ours the leaflets flabelliform, many-cleft, cuneate at base. Flowers white or rose-colored; invol-

involucre none; umbels compound; involucre-bracts several, small, narrow. Calyx-lobes prominent. Fruit globose; ribs inconspicuous, filiform, acutish; stylopodium conical; oil-tubes present in the intervals, 2 on the commissure side. W. (Latin name, from Gk. *koris*=a bug; from the bed-bug-like odor of the leaves.)

C. sativum L. (Cultivated Coriander)

OROGENIA

Plant glabrous; roots tuberous or fusiform; stems 0—3 dm. high. Leaves ternate; segments linear. Flowers white; involucre none; involucrels of few linear bractlets; umbels somewhat compound; umbel-rays very unequal. Calyx-teeth very minute. Fruit oblong, glabrous; carpels much flattened dorsally; dorsal and intermediate ribs filiform; lateral ribs very much corky-thickened, bent toward the adjacent carpel leaving a hollow with a longitudinal division in it; stylopodium depressed; oil-tubes very small, 4 groups of 3 on the convex side, 2 groups of 2 or 4 on the commissure side. (Gk. *oros*=a mountain, *gennao*=to beget; they are mountain plants.)

A. Stem from deep-seated round tubers; leaves 1—2-ternate; leaflets 2.5—5 cm. long, entire; fruit 3—4 mm. long. W. E.

O. linearifolia Wats.

AA. Stem from long fusiform roots; leaves 2—3-ternate; leaflets 2.5 cm. or less long, terminal one often 3-parted; fruit about 6 mm. long. E. (*O. fusiformis leibergi*.)

O. fusiformis Wats.

HESPEROGENIA

Low, without leafy stem. Leaves 1—2-ternate; leaf-segments rather wide. Flowers yellow; umbels compound; rays 3—6, unequal; involucre none; bractlets 1—2. Sepals none. Fruit orbicular to short-oblong, rounded at base and apex, glabrous; carpels nearly terete; ribs equal, indistinct, filiform; stylopodium none; oil-tubes 2—3 in each interval, 2 on the commissure side. (Gk. *hespera*=evening or western, *gennao*=to beget; a western genus.) C. *H. stricklandi* R. & C.

DRUDEOPHYTUM (Deweya, Velaea)

Perennial; roots thick, elongated; stems present or none. Leaves mostly basal, pinnate or ternate. Flowers yellow; involucrels conspicuous; involucre present or none. Calyx-teeth none or present. Fruit orbicular, flattened laterally, glabrous or pubescent; carpels with 5 slender filiform ribs; stylopodium none; oil-tubes conspicuous, 3—6 in the intervals, 4—10 on the commissure side. (Origin?)

A. Calyx-teeth none; involucrels inconspicuous.

B. Foliage more or less scabrous; pedicels 6—8 mm. long; leaflets 1—3.5 cm. long. U.

D. kelloggii C. & R.

BB. Foliage glabrous, glaucous; pedicels 2 mm. or less long; leaflets 1.2 cm. or less long. U.

D. glaucum C. & R.

AA. Calyx-teeth evident; involucrels exceedingly prominent and exactly like the leaves. U.

D. howellii C. & R.

BUPLEURUM

THORO-WAX

Annual or perennial (ours). Stem-leaves simple, oblong to linear (ours), entire, clasping or perfoliate; basal leaves linear-lanceolate (ours). Flowers yellow; umbel compound (ours); involucre of 3—5 bracts (ours); involucrels of 5—8 small ovate bract-

lets (ours). Calyx-teeth none. Fruit oblong, flattened laterally, with rather wide commissure; ribs equal, very slender or prominent (ours); stylopodium prominent, flat; oil-tubes none or continuous about the seed cavity (ours). (Gk. bous=an ox, pleuron=a rib; referring to the conspicuous leaf-veins of some species.) E.

E. americana C. & R.

ZIZIA

ALEXANDERS

Perennial, smooth; stem 3—9 dm. high. Leaves mostly simple or ternate or quinate; in ours the radical leaves simple, cordate, crenately toothed. Flowers yellow; umbels compound; involucre none; involucels of small bractlets. Calyx-teeth prominent. Fruit oblong or ovate, glabrous, flattened laterally; central fruit in each umbellet sessile; stylopodium none; oil-tubes large, 1 in each interval, 2 on the commissure side. (Honor of I. B. Ziz, a Rhenish botanist.) E.

Z. cordata Koch (Heart-leaved Alexanders)

CICUTA

WATER HEMLOCK

Tall, glabrous, branching, poisonous, in marshes. Leaves pinnate or ternate; leaflets serrate. Flowers white; involucre none or of few bracts; umbels compound, many-rayed. Calyx-lobes prominent. Fruit oblong to orbicular, laterally flattened, glabrous; stylopodium conical; ribs corky, strong, flattish, the laterals the largest; oil-tubes 1 in each interval, 2 on the commissure side. (The Latin name.)

A. Bulblets not present in the axils of the leaves.

B. Fruit orbicular.

C. Leaflets lanceolate to ovate-lanceolate, closely and sharply toothed or even cleft, strongly reticulate beneath, thickish. W. E. (*C. purpurata*.)

C. douglasii C. & R.

CC. Leaves lanceolate to linear-lanceolate, not so closely nor sharply serrate, not strongly reticulate beneath, thinner. W. E.

C. vagans Gr.

BB. Fruit oblong. E. *C. occidentalis* Gr.

AA. Bulblets present in the axils of the upper leaves. E.

C. bulbifera L.

AMMI

BISHOP'S-WEED

Annual, glabrous. Flowers white; involucre of foliaceous bracts; involucel-bracts prominent or minute. Fruit small, ovate, glabrous, flattened laterally dorsal and intermediate ribs filiform to wide and obtuse; lateral ribs closely applied to those of the other carpel and forming a dilated band to the fruit; stylopodium flat or none; oil-tubes 1 in each interval. (Greek name for some plant of this family.) W.

A. visnaga Lam. (Tooth-pick Plant)

TAENIOPLEURUM

Herbs. Erect, glabrous, from a fascicle of thickened root-fibers; stems 9—12 dm. high. Leaves ternate and then 1—2-pinnate; leaflets toothed, lanceolate to ovate. Flowers white; involucre and involucels of many conspicuous bracts. Calyx-lobes prominent. Fruit flattened laterally, oblong, glabrous; ribs wide, prominent; stylopodium prominent, conical; oil-tubes very large, 1 in each interval, 2 on the commissure side. (Gk. taenion=a band, pleuron=a rib; referring to the wide ribs of the carpels.) U.

T. howellii C. & R.

CARUM

CARAWAY

Glabrous, erect, slender; roots fascicled, tuberous or fusiform. Leaves pinnate; in ours the leaflets few, linear. Flowers white; involucre and involucels of few to many bracts. Calyx-lobes small but prominent for size of fruit. Fruit flattened laterally, oblong to orbicular, glabrous; ribs filiform or inconspicuous; stylopodium conical; oil-tubes large, 1 in each interval, 2—6 on the commissure side. (From Caria, a country in Asia Minor, where first found.)

A. Even the upper leaves twice pinnate; fruit oblong, 4—5 mm. long. W.
C. carui L. (Garden Caraway)

AA. At least the upper few leaves only once pinnate.

B. Fruit orbicular, 2 mm. long. W. C. E.
C. gairdneri Gray

BB. Fruit oblong, 3—4 mm. long.

C. Fruit rounded at both ends, with inconspicuous ribs. C. E.
C. oreganum Wats.

CC. Fruit narrowed at both ends, with conspicuous ribs. U.
C. lemmoni C. & R.

LEIBERGIA

Slender, glabrous, from small globose tubers, 1.2—5 dm. high; stems none. Leaves ternate; leaflets 1—7.5 cm. long, filiform, entire or few-toothed, terminal one often again 1—2-ternate. Flowers white; umbels irregular; involucre none; involucels of a few small bracts. Calyx-lobes none. Fruit 8 mm. long, flattened laterally, linear, beaked, glabrous; carpels but slightly flattened dorsally; ribs 5, filiform, the 2 lateral a little the most prominent and turned inward; stylopodium none; oil-tubes small, 1 in each interval, 2 on the commissure side. (Honor of Mr. Leiberg, who collected along the Great Northern railroad in 1893.) *E. L. orogenioides* C. & R.

EULOPHUS

Perennial, glabrous, 3—15 dm. high (ours 6 dm.); tubers fascicled. Leaves pinnately (ours) or ternately compound, leaflets or segments narrowly linear (ours) to oblong-linear, mostly entire, the terminal one elongated. Flowers white or pinkish; involucre from none to prominent (ours); umbels long-peduncled, 10—25-rayed (ours); involucel-bracts several, lanceolate, acuminate, usually scabrous. Calyx-lobes prominent. Fruit flattened laterally, ovate to linear-oblong (ours), glabrous; ribs equal, filiform; stylopodium conical; oil-tubes 1—5 in each interval, 4—8 (ours 6) on the commissure side. (Gk. eu=well, lophos=a plume; apparently referring to the plume-like leaves.)

E.
E. bolanderi C. & R.

SIUM

WATER PARSNIP

Perennial, in water or in wet places; ours with stem stout, 6—18 dm. high. Leaves pinnate; leaflets serrate (ours) or pinnatifid; leaflets in ours 3—8 pairs, linear to lanceolate, mostly acuminate, 5—12.5 cm. long; in ours submerged leaves when present finely dissected. Flowers many, white, involucre and involucels of many narrow bracts, in ours umbel many-rayed, rays 2.5—3.7 cm. long. Calyx-lobes minute. Fruit ovate to oblong, glabrous, flattened laterally; ribs prominent, nearly equal, corky; stylopodium

depressed; style short: oil-tubes 1—3 in each interval, 2—6 on the commissure side. W. E. (Gk. sion=the name of some marsh plant.) W. E.

S. cicutaeifolium Schk.

BERULA

Perennial, glabrous, aquatic, 2—9 dm. high (ours). Leaves 1-pinnate; in ours the leaflets 10—18, linear to oblong or ovate, serrate to laciniately lobed, 2—8 cm. long. Flowers white; involucre and involucels of narrow bracts, usually conspicuous. Calyx-teeth minute. Fruit flattened laterally, nearly round, emarginate at base, glabrous; carpels nearly globose; ribs very slender, inconspicuous; stylopodium conical; oil-tubes close together, many. (The Latin name of the Water Cress.) W. E.

B. erecta Cov.

OENANTHE

Perennial, glabrous, mostly aquatic; stems 6—15 dm. high (ours). Leaves ternate or pinnate or decompound (ours ternate and 2-pinnate); in ours leaflets ovate, acuminate, toothed, often lobed at base, 1—2.5 cm. long. Flowers white; umbels many-rayed (ours); involucre usually present; involucels present (ours). Calyx-lobes rather prominent. Fruit globose, slightly flattened laterally, 4 mm. long (ours), glabrous; ribs obtuse, wide, corky, lateral ones largest; stylopodium short, conic; oil-tubes 2 on the commissure side. (Gk. oinos=wine, anthos=a flower; some species were used for scenting wine.) W. C.

O. sarmentosa Presl. (Water Celery)

LILAEOPSIS (Crantzia)

Perennial, small, glabrous, creeping and rooting in the mud. Leaves reduced to hollow cylindric awl-like petioles, jointed by transverse partitions, 3—18 cm. long (ours). Flowers white; involucre-bracts minute; umbel simple, few-flowered; peduncles 2—4 cm. long (ours). Calyx-teeth small. Fruit globose, slightly flattened laterally, glabrous; ribs filiform, lateral ones very thick and corky; stylopodium depressed; oil-tubes 1 in each interval, 2 on the commissure side. (From *Lilaea*, a genus which it resembles, +Gk. opsis=like.) W. (*C. lineata* for our region.)

L. occidentalis C. & R.

SPHENOSCIADIUM

Perennial; stem nearly simple, stout, glabrous up to the umbel, 3—15 dm. high (ours). Leaves 1—2-pinnate; leaflets in ours oblong to linear-lanceolate. Flowers white to purplish, scarious; umbel 4—15-rayed (ours); flowers and fruit sessile on an enlarged receptacle forming compact heads; involucre none; umbel tomentose. Calyx-lobes none. Fruit flattened dorsally, cuneate-obovate, 5 mm. long (ours), hirsute; ribs strong at base, winged above; stylopodium small, conic; oil-tubes 1 in each interval, 2 on the commissure side. (Gk. spen=a wedge, skiadion=an umbrella; probably referring to the form of the fruit.) E. (*Selinum capitellatum*.)

S. capitellatum Gray

LIGUSTICUM

LOVAGE

Perennial; roots large, aromatic. Leaves usually large, ternately and often again pinnately compound, or in a few only 1-pinnate. Flowers white or pinkish; involucre

usually none; umbels large, many-rayed; involucre-bracts usually narrow. Calyx-lobes none or small. Fruit oblong or ovate, flattened laterally if at all, glabrous; ribs all prominent, equal, acute or sometimes slightly winged; stylopodium conic; oil-tubes 2—6 in each interval, 6—10 on the commissure side. (From the country Liguria, in northwestern Italy, where the Garden Lovage was first found.)

A. Leaves 2-ternate, not pinnate; leaflets ovate to nearly round, coarsely toothed; stem simple. W. *L. scoticum* L. (Scotch Lovage)

AA. Leaves ternate and then pinnate.

B. Leaflets 2.5—7.5 cm. long, ovate to oblong, serrate or toothed. E. *L. verticillatum* C. & R.

BB. Leaflets smaller, laciniately toothed or pinnatifid.

C. Stems more or less leafy.

D. Fruit merely ribbed, not at all winged.

E. Leaflets coarsely toothed or lobed. W. (*Pimpinella apiodora*; *Pimpinella apiodora nudicaulis*.)

L. apiodorum C. & R.

EE. Leaflets deeply cleft into linear lobes. W.

L. apiifolium Gray

DD. Fruit more or less winged.

F. Leaflets somewhat confluent; inflorescence glabrous. C. E

L. canbyi C. & R.

FF. Leaflets distinct; inflorescence puberulent. E.

L. leibergeri C. & R.

CC. Stems naked or nearly so and thus apparently scapes.

G. Ultimate divisions of the leaves narrowly linear to filiform. E

L. tenuifolium Wats.

GG. Ultimate divisions of the leaves wider.

H. Flowers purple or purplish. C.

L. purpureum C. & R.

HH. Flowers white.

I. Rays of the umbels 5 cm. or less long; leaflets small, crowded.

J. Rays of the umbels 1—2 cm. long. W.

L. grayi C. & R.

JJ. Rays of the umbels 2.5—5 cm. long. W.

L. oreganum C. & R.

II. Rays of the umbels 5 cm. or more long; leaflets larger, 1—2.5 cm. long, distant. E. *L. cusickii* C. & R.

COELOPLEURUM

Perennial, stout, glabrous but puberulent in the inflorescence, along seacoasts. Leaves 2—3-ternate; petioles very large, inflated. Flowers greenish-white; umbels many-rayed; involucre few-leaved, deciduous; involucre-bracts many, linear-lanceolate, small or rarely conspicuous. Calyx-lobes none. Fruit oblong, slightly flattened laterally if at all, glabrous; ribs very thick, corky, becoming hollow; oil-tubes small, 1 in each interval, 1—2 under each rib, 2 on the commissure side. (Gk. koilos=hollow, pleuron=a rib; from the hollow fruit-ribs.)

A. Leaflets acute or acuminate, usually narrowed at base, less than 5 cm. long; fruit 3 mm. wide. W. (*C. gmelini* for our region.)

C. longipes C. & R.

AA. Leaflets obtuse, usually cordate at base, 6—7.5 cm. long; fruit 5—6 mm. wide.

W. *C. maritimum* C. & R.

THASPIUM

MEADOW-PARSNIP

Perennial, 6—15 dm. high. Leaves ternately compound, or the lower ones simple; leaf divisions sometimes pinnate; leaflets wide, serrate or toothed. Flowers mostly yellow (so in ours); involucre usually none; involucre-bracts small; umbel 8—12-rayed (ours). Calyx-lobes inconspicuous. Fruit ovoid or oblong, slightly flattened dorsally if at all, mostly glabrous; all the ribs strongly winged (ours); stylopodium none; oil-tubes 1 in each interval, 2 on the commissure side. (A modification of *Thapsia*, a nearly related genus which was named after the island of Thapsus.) E. (*T. trifoliatum aureum*.)

T. aureum Nutt. (Golden Meadow-parsnip)

CONIOSELINUM

HEMLOCK PARSLEY

Perennial, glabrous or the inflorescence sometimes puberulent. Leaves ternate and then pinnate; leaflets ovate, acute, laciniately toothed or lobed. Flowers white; involucre none to conspicuous; involucre-bracts numerous, narrow. Calyx-lobes none. Fruit dorsally flattened, oblong, glabrous; ribs prominent, sometimes winged; lateral ones broadly winged and thickish; stylopodium slightly conical; oil-tubes usually 1 in each dorsal interval, 1 to several in each lateral one, 2—8 on the commissure side. (From the genera *Conium* and *Selinum*, both of which these plants resemble.)

A. Umbel-rays about 2.5 cm. long; pedicels 4—6 mm. long; leaflets entire to laciniate-toothed. W. (*Selinum benthami*; *Selinum hookeri*.)

C. gmelini C. & R.

AA. Umbel-rays 5—7.5 cm. long; pedicels 12 mm. long; leaflets laciniately pinnatifid.

E. (*Ligusticum scopulorum*.) *C. scopulorum* C. & R.

ANGELICA

ANGELICA

Perennial, stout. Leaves ternate and then pinnate or rarely merely 1-pinnate. Flowers white or greenish-yellow or purplish; umbels large, terminal; involucre scanty or none; involucre-bracts small or none. Calyx-lobes mostly none. Fruit flattened dorsally, ovate or oblong, glabrous or pubescent; ribs strong; lateral ribs usually strongly winged, forming a double-winged margin to the fruit; stylopodium conic; oil-tubes 1—several in the intervals, or indefinite, 2—10 on the commissure side. (Angelic in its supposed medicinal value.)

A. Stem and lower leaf-surface densely tomentose. W.

A. hendersoni C. & R.

AA. Stem and lower leaf-surface not tomentose.

B. Involucels of numerous linear bracts.

C. Involucre none; umbel-rays 2.5—10 cm. long; pedicels 8—12 mm. long.

W. C. E.

A. genuflexa Nutt.

CC. Involucre conspicuous; umbel-rays 2.5 cm. or less long; pedicels 4—6 mm. long. E. (*Thaspium aureum involucreatum*.)

A. dawsoni Wats.

BB. Involucels usually none.

D. Oil-tube 1 in each interval.

E. Fruit glabrous when mature.

F. Flowers greenish-yellow or dull-purple; pedicels not distinctly united at base. E. *A. pinnata* Wats.

FF. Flowers white; pedicels united at base.

- G. Fruit 6—8 mm. long, its lateral wings thick, corky. W.
 A. arguta Nutt.
- GG. Fruit 4—6 mm. long, its lateral wings not corky-thickened. W. C.
 E. *A. lyallii* Wats.
- EE. Fruit not glabrous; pedicels not distinctly united at base.
- H. Fruit hispid; flowers white. E. (*Selinum kingii*.)
 A. kingii C. & R.
- HH. Fruit papillate; flowers greenish or purplish. E.
 A. roseana Hend.
- DD. Oil-tubes 1 in each dorsal interval, and 2 in each lateral one; flowers pinkish. C. E.
 A. canbyi C. & R.

GLEHNIA

Low, tomentose-villous, on the sands of the seashore. Leaves 1—2-ternate or ternate and then pinnate, coriaceous; leaflets ovate to roundish, more or less confluent, densely white-tomentose beneath, callus-serrate to dentate, 2.5—5 cm. long. Flowers whitish, in head-like clusters; umbel-rays 10—12, 12—24 mm. long, involucre and involucels of subulate bracts. Calyx-lobes small. Fruit globose, glabrous, 8—10 mm. in diameter; carpels somewhat flattened dorsally, winged; wings 5, equal, 3 mm. wide, corky, thickened; lateral wings distinct from those of the other carpel; stylopodium depressed; oil-tubes 2—3 in each interval but appearing equally distributed, 4—6 on the commissure side. (Probably Gk. *glenos*=a thing to stare at, because it is so woolly.) W. (*Phellipterus littoralis*.)
 G. littoralis Schmidt

PHELLOPTERUS

Plant, low; acaulescent or nearly so. Leaves pale, 1—3-pinnate; usually the leaf-segments short, wide, crowded, somewhat confluent. Flowers purple (ours); mostly the involucre and involucels conspicuous (so in ours), similar, more or less hyaline. Calyx-lobes evident. Fruit oblong or orbicular (ours), glabrous, 10—12 mm. long (ours); carpel-wings 3—5, wide, thin throughout or very nearly so; lateral wings distinct from those of the other carpel; stylopodium none; oil-tubes 2—3 (ours) in each interval, 4(ours)—8 on the commissure side. (Gk. *phellos*=cork, *pteron*=a wing; referring to the wings of the fruit.) E. *P. purpurascens* C. & R.

PTERYXIA

Acaulescent or nearly so, clothed at base with the persistent leaf-sheaths. Leaves bright green or somewhat pale green, clustered at the stem-base; main division ternate and then pinnately finely dissected; segments short, linear, somewhat hard-pointed. Flowers yellow or white; involucre usually none; involucel-bracts narrow, not at all hyaline. Calyx-lobes evident. Fruit oblong to orbicular, glabrous; carpel usually strongly flattened dorsally; carpel-wings thin thruout; lateral ribs broadly winged; dorsal and intermediate ribs from strong-ribbed to broad-winged; stylopodium none; oil-tubes several in each interval. (Gk. *pteryx*=a bird's wing; from the wide fruit-wings.)

- A. Flowers yellow.
- B. Leaf-segments pale, narrow, rigid. E. (*Cymopterus terebinthinus*.)
 P. terebinthina C. & R.
- BB. Leaf-segments greener, not so rigid.
- C. Leaves of wide outline.

- D. Plants low, 1—3 dm. high.
 E. Dorsal ribs of the carpels with wide wings. E.
P. foeniculacea Nutt.
 EE. Dorsal ribs of the carpels with narrow wings. E.
P. thapsoides Nutt.
 DD. Plants taller, 4 dm. or more high. U.
P. californica C. & R.
 CC. Leaves of narrow outline.
 F. Pinnae of leaves small, distant. E.
P. petraea C. & R.
 FF. Pinnae of leaves larger, more crowded. E.
P. calcarea C. & R.
 AA. Flowers white. E. *P. albiflora* Nutt.

AULOSPERMUM

Caulescent or acaulescent. Leaves pinnately dissected, or ternately and then pinnately dissected. Flowers white or yellow or purple; involucre usually none (present in ours); involucre-bracts small, exceeding the involucre-bracts (ours). Calyx-lobes evident. Fruit oblong to orbicular, glabrous; carpel-wings 3—5, usually wide, thick at the insertion or not at all; stylopodium none; oil-tubes several in each interval (ours), 2 or more on the commissure side. (Gk. aulos=a tube; sperma=a seed; apparently from the numerous oil-tubes in the seed.) E. (*Cymopterus glaucum*.)

A. glaucum C. & R.

CYMOPTERUS

Plant dwarf, xerophytic; acaulescent. Leaves small, 1—3(ours)-pinnate. Flowers white or yellow, peduncles equaling or exceeding (ours) the leaves; involucre none (ours); involucre-bracts usually conspicuous and foliaceous, somewhat 3-cleft at apex (ours). Calyx-lobes present or none. Fruit flattened dorsally, ovate to oblong (ours), 10 mm. long (ours), glabrous (ours) or puberulent at the tip; dorsal and intermediate ribs filiform or winged; lateral wings wide, very thick, corky, coherent until maturity with those of the other carpel, forming a margin to the fruit usually thicker than the fruit-body; stylopodium none; oil-tubes very small, 1—8 in each interval, 2—14 on the commissure side. (Gk. kyma=a wave, pteron=a wing; the wings of the fruit are often wavy.) E.

C. leibergii C. & R.

RHYSOPTERUS

Low, glabrous, on dry soil; stem short, slender, somewhat subterranean. Leaves 2—3 cm. long (ours), somewhat clustered at the stem-tip, 1—2-pinnate, thick or coriaceous; leaf-segments wide, of 3 leaflets each (ours); the lateral leaflets 2-lobed, the terminal 3-lobed. Flowers white; involucre none; rays stout (ours), 8—10 mm. long (ours); involucre-bracts rather conspicuous. Calyx-lobes evident. Fruit flattened laterally, 3 mm. long (ours), nearly orbicular, glabrous; carpels flattened dorsally, boat-shaped, the margin and ends incurved; ribs 5, equal, prominent, obtuse, corky; stylopodium none; oil-tubes small, 1 in each interval, 2 on the commissure side. (Gk. rhysos=wrinkled, pteron=a wing; referring to the fruit-wings.) E.

R. plurijugus C. & R.

PSEUDOCYMOPTERUS

Caulescent (ours) or not. Leaves 2-pinnate. Flowers various in color; involucre none or very rarely of 1—2 bracts; involucre-bracts mostly linear. Calyx-lobes evident. Fruit oblong, glabrous; dorsal and intermediate ribs very prominent, acute, sometimes narrowly winged; lateral wings rather wide, thickish, equaling or exceeding the others, distinct from those of the other carpel; stylopodium none; oil-tubes 1—4 in each interval, 2—8 on the commissure side. (Gk. *pseudos*=false, + *Cymopterus*, a related genus.)

A. Leaves on long petioles; leaf-segments acutely hard-tipped. E.

P. anisatus C. & R.

AA. Leaves on short petioles, very pale or glaucous; leaf-segments not so hard-tipped.

B. Peduncles 3—5 cm. long. E.

P. hendersoni C. & R.

BB. Peduncles 10—20 cm. long. E.

P. bipinnatus C. & R.

OXYPOLIS

COW-BANE

Smooth, erect, swamp plants. Leaves simple or pinnate (ours) or ternate or reduced to petioles. Flowers white; involucre-bracts few or none; involucre-bracts few (ours) or none. Calyx-lobes evident. Fruit flattened laterally, ovate to obovate, 5 mm. long (ours), glabrous; dorsal and intermediate ribs filiform; lateral wings closely applied to those of the other carpel, veined dorsally and thus carpel apparently with 5 dorsal ribs; stylopodium thick, short, conical; oil-tubes 1 in each interval, 2—6 on the commissure side. (Probably Gk. *oxys*=sharp, *polion*=a plant with a strong odor.) E.

O. occidentalis C. & R.

LEPTOTAENIA

Perennial, glabrous, usually tall and stout; nearly acaulescent. Leaves usually large, pinnately decomposed. Flowers yellow or purple; involucre none or of few bracts; involucre-bracts many, small. Calyx-lobes none or evident. Fruit flattened dorsally, oblong-elliptic, glabrous; dorsal and intermediate ribs filiform or obscure; lateral wings very thick, corky; commissure-face with a prominent central longitudinal ridge; stylopodium none; oil-tubes 3—6 in each interval, 4—6 on the commissure side, mostly small, sometimes none. (Gk. *leptos*=slender, *tainia*=a band; referring to the filiform fruit-ribs.)

A. Foliage puberulent.

B. Fruit sessile or nearly so; staminate flowers on slender pedicels.

C. Flowers purple. W. E.

L. dissecta Nutt.

CC. Flowers yellow. E.

L. foliosa C. & R.

BB. Fruit with pedicels longer than those of the staminate flowers; flowers yellow.

D. Fruit usually 8—12 mm. long; leaves finely dissected. E.

L. multifida Nutt.

DD. Fruit 16—18 mm. long; leaves less dissected. E.

L. eatoni C. & R.

AA. Foliage glabrous.

E. Leaves finely dissected; segments narrower.

F. Fruit broadly oblong, 10—12 mm. wide, lateral wings prominent, thick; oil-tubes conspicuous, 3 in each interval; leaflets filiform. E.

L. purpureum C. & R.

- FF. Fruit narrowly oblong or short-oblong, 4—6 mm. wide; lateral wings not prominent; oil-tubes inconspicuous, 0—1 in each interval; leaflets shorter.
- G. Fruit short-oblong; peduncles slender.
 - H. Leaflets ridged, hard-tipped; flowers purple. E.
 - L. watsoni* C. & R.
 - HH. Leaflets thin, not rigid.
 - I. Flowers salmon-colored; pedicels long. E.
 - L. salmoniflora* C. & R.
 - II. Flowers deep yellow; pedicels short. E.
 - L. leibergii* C. & R.
 - GG. Fruit narrowly oblong; peduncles enlarged and turgid. E.
 - L. minor* Rose
- EE. Leaflets cuneate-obovate. U. E.
 - L. californica* Nutt.

LOMATIUM (Peucedanum, Cogswellia) HOG-FENNEL

Perennial, on dry soil; acaulescent or nearly so. Leaves ternate or pinnate to dissected. Flowers white or purple or yellow; involucre none; involucels mostly present. Calyx-lobes none or rarely evident. Fruit strongly flattened dorsally, oblong to orbicular; dorsal and intermediate ribs approximate, filiform; lateral ribs winged, coherent with those of the other carpel; stylopodium none; oil-tubes 1 to several in each interval, rarely none, 2—10 on the commissure face. (Gk. loma—a border, referring to the fruit-wings.)

- A. Plants arising from globose tubers, mostly not tall; leaves small, more or less dissected.
- B. Flowers white.
 - C. Fruit puberulent. E. *L. gormanii* C. & R.
- CC. Fruit glabrous.
 - D. Oil-tubes none. E. (*P. evittatum*.)
 - L. geyeri* C. & R.
- DD. Oil-tubes present.
 - E. Oil-tube 1 in each interval.
 - F. Lateral wings thickish; umbels 2—5-rayed; rays 1—2 cm. long; pedicels 3—4 mm. long; fruit 8 mm. long. E.
 - L. hendersonii* C. & R.
 - FF. Lateral wings thin; umbels 5—10-rayed; rays 2.5—5 cm. long; pedicels 8—12 mm. long; fruit 5 mm. long. E.
 - L. canbyi* C. & R.
 - EE. Oil-tubes several in each interval.
 - G. Pedicels slender, 8—16 mm. long, longer than the fruit; tubers 2—3; fruit-wings less than half as wide as the body. E.
 - L. farinosum* C. & R.
 - GG. Pedicels very short, much shorter than the fruit; tuber 1; fruit-wings about half as wide as the body. E.
 - L. piperi* C. & R.
- BB. Flowers yellow.
 - H. Fruit linear.
 - I. Umbellets open; pedicels slender, 4—8 mm. long; involucels none. C. E.
 - L. ambiguum* C. & R.
 - II. Umbellets compact; pedicels almost none; involucels of small linear bracts. E.
 - L. leptocarpum* C. & R.
 - HH. Fruit oblong or ovate.

- J. Oil-tube 1 in each interval.
- K. Fruit glabrous; leaves ternate and then 1—2-pinnate. E.
 - L. circumdatum* C. & R.
- KK. Fruit somewhat puberulent; leaves pinnate. E.
 - L. cous* C. & R. (Cous Biscuit-root)
- JJ. Oil-tubes several in each interval.
- L. Fruit puberulent; involucl-bracts united nearly to the top. E.
 - L. watsoni* C. & R.
- LL. Fruit glabrous; involucl-bracts distinct. E.
 - L. montanum* C. & R.
- AA. Plants arising from somewhat thickened roots but hardly tubers, mostly stout, often tall; leaves various.
- M. Peduncles usually slender, never swollen at the top.
- N. Involucl-bracts conspicuous, often wide or united at base.
- O. Flowers white.
- P. Fruit glabrous; oil-tube 0—1 in each interval.
- Q. Involucl-bracts not scarious-margined, often united; umbel rays 2—10 cm. long; fruit 6—24 mm. long, 3—7 mm. wide. W. E. (*P. eurycarpum*; *L. macrocarpum semivittatum*; *L. artemisiarum*.)
 - L. macrocarpum* C. & R.
- QQ. Involucl-bracts scarious-margined, not united; umbel-rays 1—3.5 cm. long; fruit 5 mm. long, 4 mm. wide. E.
 - L. orientale* C. & R.
- PP. Fruit pubescent; oil-tubes 3—4 in each interval. E.
 - L. nevadense* C. & R.
- OO. Flowers yellow.
- R. Ultimate leaf-segments narrowly linear; involucl-bracts obovate; oil-tube 1 in each interval. W.
 - L. utriculatum* C. & R.
- RR. Ultimate leaf-segments short, obtuse; involucl-bracts linear; oil-tubes 2—3 in each interval. E.
 - L. vaginatum* C. & R.
- NN. Involucl-bracts none or small.
- S. Fruit from narrowly to widely oblong.
- T. Leaves narrow in outline, usually pinnate.
- U. Fruit puberulent. E.
 - L. oreganum* C. & R.
- UU. Fruit glabrous.
- V. Oil-tubes more than 3 in each interval. C.
 - L. hallii* C. & R.
- VV. Oil-tube 1 in each interval.
- W. Flowers deep yellow; leaf-segments minute; fruit 5 mm. long. E.
 - L. leibergi* C. & R.
- WW. Flowers pale yellow; leaf-segments larger; fruit 8—16 mm. long. W. C. E. (*L. martindalei angustatum*.)
 - L. martindalei* C. & R.
- TT. Leaves wide in outline, with at least the primary divisions ternate.
- X. Leaves rather simply 1—3-ternate.
- Y. Wings wide.
- Z. Oil-tube only 1 in each interval; flowers yellow.

- a. Leaves 3-ternate; leaf-segments 6—18 mm. long; pedicels 8—10 mm. long. E.
L. laevigatum C. & R.
- aa. Leaves 1—2-ternate; leaf-segments 5—10 cm. long; pedicels 2—6 mm. long. E. (*P. simplex*.)
L. platycarpum C. & R.
- ZZ. Oil-tubes 1—3 in each interval; flowers white. E.
L. cusickii C. & R.
- YY. Wings narrow; oil-tube 1 in each interval.
 - b. Ovaries glabrous; involucre-bracts lanceolate or setaceous; pedicels 2—4 mm. long. W. C. E.
L. triternatum C. & R.
 - bb. Ovaries puberulent.
 - c. Ribs of the fruit filiform; involucre-bracts linear-setaceous; pedicels 2—4 mm. long. E. (*P. triternatum macrocarpum*.)
L. robustius C. & R.
 - cc. Ribs of the fruit sharp; involucre-bracts none; pedicels 4—7 mm. long. E. (*P. triternatum alatum*.)
L. alatum C. & R.
- XX. Leaves usually much dissected into short segments.
 - d. Plant glabrous thruout; flowers yellow.
 - e. Oil-tube 1 in each interval. E.
L. grayi C. & R.
 - ee. Oil-tubes several in each interval.
 - f. Petioles with white-scarious margins; fruit puberulent. E.
L. sandbergii C. & R.
 - ff. Petioles without white-scarious margins; fruit glabrous.
 - g. Fruit 5 mm. long, its wings very narrow. E.
L. microcarpum C. & R.
 - gg. Fruit 7—8 mm. long, its wings somewhat wide. E.
L. donnellii C. & R.
 - dd. Plant puberulent thruout.
 - h. Umbel rays 2.5—8.5 cm. long; fruit glabrate, 10—16 mm. long, 4—5 mm. wide, its wings half as wide as the body or less. W. E. (*P. triternatum brevifolium*.)
L. brevifolium C. & R.
 - hh. Umbel rays 1—3 cm. long; fruit pubescent, 8 mm. long, 6—7 mm. wide, its wings more than half as wide as the body. E.
L. jonesii C. & R.
 - MM. Peduncles stout, sometimes much swollen at the top.
 - SS. Fruit linear. E. *L. bicolor* C. & R.
 - i. Fruit 6—14 mm. long, 3—6 mm. wide.
 - j. Oil-tubes 3 in each interval, small; plant glabrous. E. (*P. nuttallii*.)
L. platyphyllum C. & R.
 - jj. Oil-tubes 1—2 in each interval, large.
 - k. Plant more or less puberulent; involucre-bracts linear or setaceous. E.
L. anomalum Jones
 - kk. Plant glabrous; involucre-bracts none. W. E. (*P. leiocarpum*.)
L. nudicaule C. & R. (Indian Consumption-plant)
 - ii. Fruit 18—28 mm. long; 6—12 mm. wide. E.
L. suksdorfii C. & R.

ERYPTERA

Herbs. Perennial, glabrous; acaulescent (ours). Leaves in ours 2-ternate or -quinate; leaflets sharply toothed, often 3-lobed (ours), cuneate-orbicular to round-cordate (ours). Flowers yellow; peduncles 3—4.5 cm. high (ours); involucre-bracts lanceolate (ours). Calyx-lobes minute or none. Fruit strongly flattened dorsally, orbicular to short-oblong; dorsal and intermediate ribs filiform, approximate; lateral ribs with wings often wider than the seed-body, cohering with the other carpel; stylopodium none; oil-tubes 1 to several in each interval (3—4 in ours). (Gk. *eryon*=extended, *pteron*=a wing; referring to the fruit-wing.) U. (*Peucedanum howellii*.)

E. howellii C. & R.

CYNOMARATHRUM

Perennial, glabrous (ours); acaulescent or nearly so, densely clothed with old leaf-sheaths. Leaves narrow, first division pinnate, or ternately decompound (ours); ultimate segments lanceolate (ours). Flowers yellow (ours) or white. Calyx-teeth evident. Fruit strongly flattened dorsally, oblong; dorsal and intermediate ribs sharp or winged; lateral ribs wider, winged; stylopodium flat but evident; oil-tubes in ours 2—4 in each interval, 2—6 on the commissure side. (Gk. *kyon*=dog, *marathron*=fennel. Why?) C. E. (*Peucedanum brandegei*.)

C. brandegei C. & R.

PASTINACA

PARSNIP

Mostly biennial, tall, erect, branching; roots thick. Leaves pinnate. Flowers yellow; involucre usually none; umbels compound; rays 7—15 (ours), involucre-bracts usually none. Calyx-lobes none. Fruit oval, glabrous, much flattened dorsally; dorsal and intermediate ribs filiform; lateral ribs winged, applied to those of the other carpel and forming a wide wing to the fruit; stylopodium depressed; oil-tubes 1 in each interval, 2—4 on the commissure side. (L. *pastus*=food.) W. E.

P. sativa L. (Cultivated Parsnip)

HERACLEUM

COW PARSNIP

Perennial, tall, stout, 1—2.5 m. high (ours), pubescent or woolly (ours). Leaves large, ternately-compound; in ours the leaflets 10—25 cm. wide, round-cordate. Flowers white; involucre deciduous; umbel large, many-rayed; rays 5—15 cm. long (ours); involucre-bracts many. Calyx-lobes small or none. Fruit broadly obovate, 8—12 mm. long, dorsally much flattened, somewhat pubescent; dorsal and intermediate ribs filiform; lateral wings applied to the other carpel, strongly veined toward the margin; stylopodium thick, conical; oil-tubes 1 in each interval, conspicuous, about half as long as the carpel, 2—4 on the commissure side. (Honor of Hercules; probably because it is so large and rugged.) W. C. E. H. lanatum Michx.

DAUCUS

CARROT

Annual or biennial. Leaves pinnately decompound, finely divided. Flowers white (ours) or reddish; umbels compound; involucre-bracts foliaceous, cleft; involucre-bracts many, entire or toothed. Calyx-teeth obsolete. Stylopodium depressed or none. Fruit oblong, somewhat flattened dorsally; primary ribs 5, slender, bristly; secondary ribs 4,

winged, each bearing a row of barbed prickles; oil-tubes 1 in each interval, 2 on the commissure side. (Daukos was the Greek name for the carrot.)

A. Leaf-segments narrowly linear. W. E.

D. pusillus Michx. (Wild Carrot)

AA. Leaf-segments lanceolate. W.

D. carota L. (Cultivated Carrot)

CORNACEAE

Dogwood Family

Herbs or shrubs or trees. *Leaves opposite* (ours), mostly entire, *pinnately veined*; stipules none. Flowers in cymes or heads or ament-like clusters which are often involucrate. Calyx-limb 4—5-toothed or -lobed. Petals none or distinct, 4—5, alternate with the calyx-lobes, on the calyx. Stamens 4(ours)—5, on the calyx, alternate with the petals; anthers introrse. *Ovary inferior*, 1—2-celled; ovules 1—2, styles 1—2. *Fruit fleshy*, a drupelet or a berry.

A. Leaves deciduous, herbaceous; flowers perfect; petals present; calyx 4-toothed; fruit a drupe.

CORNUS (p. 290)

AA. Leaves evergreen, coriaceous; flowers dioicous; petals none; calyx 2—4-lobed or entire; fruit a berry.

GARRYA (p. 290)

CORNUS

DOGWOOD

Herbs or shrubs or trees. Leaves deciduous, entire (ours), sometimes apparently whorled. Flowers perfect, small, white or greenish or yellowish or purple, in cymes or heads, often involucrate with large white bracts. Calyx-tube top-shaped or campanulate; calyx-limb minutely 4-toothed. Petals 4, oblong, spreading. Ovary 2-celled; style 1. Drupe globose to oblong. Seeds 2. (L. cornu—a horn; referring to the hardness of the wood.)

A. Flowers in loose cymes, white or cream-colored, not involucrate; fruit white or blue.

B. Leaves 5—10 cm. long; calyx-teeth prominent.

C. Cyme-branches hairy; leaves loosely pubescent beneath. W. C. (*C. pubescens*.)

C. occidentalis Cov. (Western Dogwood)

CC. Cyme-branches glabrous; leaves appressed-pubescent beneath. C. E. (*C. baileyi* for our region; *C. instoloneus*.)

C. stolonifera Michx. (Red-osier Dogwood)

BB. Leaves 2.5—5 cm. long, acute at both ends; calyx-teeth minute. U.

C. glabrata Benth.

AA. Flowers in sessile umbels, yellowish, involucrate; involucre-bracts 4, 5—7 mm. long; fruit blue-black; shrub 3—4.5 m. high. U.

C. sessilis Torr.

AAA. Flowers in dense heads, greenish, involucrate; involucre-bracts 4—6, 1—7.5 cm. long; fruit red.

D. Plant 8—20 cm. high, herbaceous; involucre-bracts 1—2 cm. long. W. C. E.

C. canadensis L. (Bunch-berry)

DD. Plant 10—20 m. high, shrub or tree; involucre-bracts 4—8 cm. long. W. C.

C. nuttallii Aud. (Flowering Dogwood)

GARRYA

FEVER-BUSH

Shrubs; bark greenish; branchlets 4-angled. Leaves entire or undulate, coriaceous, evergreen. Flowers dioicous, in ament-like clusters; clusters axillary, pendulous, solitary or in 3's between the bracts; bracts in 4 rows, connate. Petals none. Calyx of the

sterile flowers 4-parted; segments linear: ovary none. Calyx of the fertile flowers shortly 2-lobed or entire: stamens none: ovary 1-celled; styles 2. Fruit a berry, blue or purple. Seeds 1—2. (Honor of M. Garry, of the Hudson Bay Company.)

A. Leaves mostly truncate or rounded at base, rounded or acute at apex, undulate, densely tomentose beneath. W. *G. elliptica* Dougl.

AA. Leaves acute at both ends, entire.

B. Leaves 3.7—6.2 cm. long, glabrous or nearly so beneath. W. C. *G. fremontii* Torr. (Bear Bush)

BB. Leaves 2.5—3.7 cm. long, densely white appressed-silky beneath. U. *G. buxifolia* Gray

PYROLACEAE

Wintergreen Family

Herbs or shrubs, low, perennial, with branched rhizomes. *Leaves none or evergreen* and coriaceous, simple, petioled. Flowers perfect, nearly regular, solitary or racemose or corymbose, white or pink or green or purple or yellow (not ours). Calyx-segments 4—5. *Petals 4—5, nearly or quite distinct.* Stamens twice as many as the petals; anthers opening by pores or slits at one end. *Ovary superior, 4—5-celled; style often curved; stigma 4—5-lobed or -crenate. Fruit a capsule, loculicidal, dehiscent.* Seeds, many, minute.

A. Leaves opposite or whorled; flowers solitary or in corymbs or umbels.

B. Flowers in corymbs or umbels; style very short; leaves on erect or ascending branches. CHIMAPHILA (p. 291)

BB. Flowers solitary; style long; leaves much clustered at base. MONESES (p. 291)

AA. Leaves basal and not showing opposite if so; flowers in racemes.

PYROLA (p. 291)

CHIMAPHILA

PIPSISSEWA

Herbs or shrubs, ours 3 dm. or less high; stems decumbent; branches leafy. Leaves opposite or whorled, short-petioled, serrate. Flowers spreading or nodding, white or purplish, in terminal corymbs. Calyx 5-cleft or -parted, persistent. Petals 5, nearly orbicular, spreading or recurved. Ovary 5-lobed, 5-celled; style very short, obconic. Capsule erect, globose, 5-valved from the top; valve-margins not woolly. (Gk. chei-ma=winter, phileo=I love; because it is evergreen.)

A. Leaves cuneate-ob lanceolate, not white-mottled; flowers usually more than 3. W. C. E. *C. umbellata* Nutt.

AA. Leaves ovate to oblong-lanceolate, often white-mottled; flowers 1—3. W. C. E. *C. menziesii* Spreng. (Spotted Pipsissewa)

MONESES

Herbs; stem decumbent. Leaves opposite or in whorls of 3, crenulate; in ours orbicular to ovate, 1.2—4 cm. long. Flower 1, terminal, drooping, on a long scape. Calyx persistent. Petals spreading, broadly ovate or orbicular. Style straight. Capsule subglobose, 4—5-lobed, 4—5-celled, 5-valved from the top; valve-margins not woolly. (Gk. monos=1, esis=delight; referring to the single beautiful flower.) W. C. E.

M. uniflora Gray (Single Beauty)

PYROLA

WINTERGREEN

Herbs, glabrous, stoloniferous. Leaves basal or none, persistent. Flowers nodding (ours) or ascending, green or white or pink (ours), racemose, on erect bracted scapes.

Calyx 5-parted, persistent. Petals 5, deciduous. Ovary 5-celled; style straight or curved; stigma 5-lobed. Capsule subglobose, 5-lobed, 5-valved from the base. (Diminutive of *L. pyrus*=the pear-tree; from the similarity of the leaves.)

A. Green leaves none or very rudimentary.

B. Flowers red. W. C. E. (*P. aphylla paucifolia*.)

P. aphylla Sm. (False Coral-root)

BB. Flowers white. (See EE.)

AA. Green leaves plainly present.

C. Style curved downwards.

D. Flowers white or greenish.

E. Calyx-lobes obtuse; flowers greenish; leaves orbicular or nearly so. W. C.

E. *P. chlorantha* Swartz (Green Wintergreen)

EE. Calyx-lobes acute; flowers white; leaves broadly ovate to spatulate-oblong. W. C. E. (*P. picta integra*; *P. picta dentata*.)

P. picta Sm. (Variable Wintergreen)

DD. Flowers red or pink.

F. Leaves thin, dull, obtuse. W. C. E. (*P. elliptica* for our region; *P. rotundifolia incarnata*.) *P. incarnata* Fisch. (Round-leaved Wintergreen)

FF. Leaves coriaceous, shining, acute. W. C. E.

P. bracteata Hook. (Pear-leaved Wintergreen)

CC. Style straight.

G. Leaves ovate; raceme 1-sided; style equaling or exceeding the petals. W. C.

E. *P. secunda* L. (1-sided Wintergreen)

GG. Leaves orbicular; raceme not 1-sided; style shorter than the petals. W. C.

E. *P. minor* L. (Small Wintergreen)

MONOTROPACEAE

Indian Pipe Family

Herbs, leafless, fleshy, white to red or brown, without green. Flowers either terminal and solitary, or else in a terminal spicate or racemose or head-like cluster. Flowers regular, perfect. Sepals 2—6, distinct or united, erect. Petals 3—6, rarely none, distinct or united, imbricated. Stamens 6—12, *hypogynous*; filaments equal, distinct or united at base; *anthers opening by slits* (except *Sarcodes*). Ovary superior, 4—6-lobed, 1—6-celled; placentae projecting from a central columella or parietal and 2-winged. Stigma capitate to funnelform. Fruit a capsule, loculicidal, 2—6-valved. Seeds many, minute.

A. Corolla none; flowers spicate.

ALLOTROPA (p. 293)

AA. Corolla of distinct petals; flowers solitary or racemose.

B. Ovary 3—5-celled; disk 10—12-toothed.

C. Stems 1-flowered; plant pure white; bracts entire. MONOTROPA (p. 293)

CC. Stems 3—20-flowered; plant yellowish or reddish; bracts erose to fimbriate.

HYPOPITYS (p. 293)

BB. Ovary 1-celled; disk inconspicuous or none; bracts laciniate-toothed or fimbriate.

PLEURICOSPORA (p. 294)

AAA. Corolla of united petals; flowers racemose or spicate or capitate.

D. Flowers in a raceme or spike; sepals 5; ovary 5-celled, none of these centrally placed.

E. Plant 3—9 dm. high; flowers rather distant, in a long and not densely scaly raceme; corolla globose-ovate; corolla-lobes recurved; anthers 2-awned on the back.

PTEROSPORA (p. 293)

- EE. Plant 1.5—3 dm. high; flowers in a short densely scaly raceme or spike; corolla campanulate; corolla-lobes erect; anthers not awned. SARCODES (p. 293)
 DD. Flowers in a head-like cluster; sepals 2, bract-like; ovary 1-celled, but apparently of 1 cell with 4 others surrounding it. HEMITOMES (p. 294)

ALLOTROPA

Scapose, red or yellowish, scaly-bracted, 1.5—3 dm. high. Flowers small, numerous, in a wand-like spike. Sepals 5, rounded, marcescent under the capsule, about 6 mm. long. Corolla none. Stamens 10; anthers didymous on long and slender filaments, extrorse in the bud, becoming introrsely pendulous. Ovary 4—5-celled; placentae central; style short. Capsule globose. (Gk. allos=another, tropa=a turn; because there are many reflexed flowers. See *Monotropa*.) W. C. E.

A. virgata T. & G.

MONOTROPA

INDIAN PIPE

Scapose, white, bracted, 1—2 dm. high. Flowers solitary, terminal, nodding. Sepals 2—4, irregular, deciduous. Petals 5—6, oblong, somewhat dilated at apex, erect, not saccate at base, tardily deciduous. Stamens 10 or 12; anthers short, peltate or reniform, horizontal, opening by transverse slits. Disk 10—12-toothed. Style short, thick; stigma funnelform. Capsule erect, 3—5-celled, 3—5-valved. (Gk. monos=1, tropa=a turn; referring to the single terminal reflexed flower. See *Allotropa*.) W. C. E.

M. uniflora L.

HYPOPITYS

PINE-SAP

Plants under conifers, yellowish or reddish; stem simple to the inflorescence, leafy-bracted. Flowers 3—20, racemose, reflexed. Sepals 3—5, nearly equal, erect, deciduous. Petals 3—5, exceeding the sepals, saccate at base, deciduous. Stamens 6—10; anthers reniform. Style short, thick; stigma funnelform. Capsule ovoid, 3—5-celled. (Gk. hypo=under, pitys=a fir tree; referring to the habitat.)

A. Bracts ovate-lanceolate, entire or slightly erose. W. C. E. (*H. multiflora*; *H. lutea*.)

H. hypopitys Small

AA. Upper bracts obovate to cuneate, erosely or laciniately fimbriate. W. C.

H. fimbriata How.

PTEROSPORA

PINE-DROPS

Tall, 3—9 dm. high (ours), scapose, scaly-bracted. Flowers red or yellowish, pendulous, in a long raceme; scape glandular-pubescent. Calyx deeply 5-parted, 2—4 mm. long (ours). Corolla white (ours), globular-urceolate, persistent, 5-lobed; lobes short, recurved. Stamens 10, included; filaments glabrous; anthers introrse, with 2 deflexed awns at base. Disk none. Style short; stigma capitate, 5-lobed. Capsule depressed-globose, pendulous, 5-lobed, 5-celled, 5-valved, apex and base intruded. Seeds globose-ovoid, with a terminal reticulate wing. (Gk. pteron=a wing, spora=a seed; the seeds are winged.) W. C. E.

P. andromeda Nutt.

SARCODES

SNOW-PLANT

Fleshy, bright red, 1.5—3 dm. high, with many scale-like bracts. Flowers many, red, in a short terminal raceme. Sepals 5, erect, persistent, 12—16 mm. long. Co-

rolla cylindric-campanulate, 5-lobed; lobes barely spreading. Stamens 10; anthers linear-oblong, erect, opening by 1 large terminal pore. Style rather long; stigma capitate, somewhat 5-lobed. Capsule depressed, 5-lobed. Seeds oval, with a small conical protuberance at the apex. (Gk. sarkos=flesh, eidos=like; the plant is fleshy.) U. C. *S. sanguinea* Torr.

HEMITOMES

CONE-PLANT

Erect, ours 1—2 dm. high, brownish. Flowers red or brownish, in a dense terminal head-like cluster. Sepals 2, bract-like, entire. Corolla tubular-urceolate, 4—5-lobed, persistent. Stamens 8 or 10; filaments filiform, long-hairy above the middle; anthers oblong. Ovary ovate; style long; stigma depressed-capitate; placentae 4, with divergent lamellae which meet adjacent edges, bearing ovules on both sides, giving the appearance of 4 exterior cells surrounding a central larger one. (Gk. hemi=half, tomos=a cutting; probably because the calyx is split into 2 sepals.) W. C.

A. congestum Gray

PLEURICOSPORA

FLOWERING FUNGUS

Less than 3 dm. high (ours), white or yellowish; scales fimbriate. Flowers white, in a short terminal raceme. Sepals 4—5, scale-like. Petals 4—5, fimbriate, distinct, similar to the sepals. Stamens 8 or 10; anthers linear, apiculate. Ovary 1-celled; style columnar; stigma depressed-capitate or somewhat funnelform. Seeds ovate, smooth. (Gk. pleurikos=pertaining to ribs, spora=seed. Why?) *Key ... little pointed*

A. Petals about 8 mm. or less long, little or not at all exceeding the sepals and bracts.

C.

P. fimbriolata Gray

AA. Petals about 12 mm. long, much exceeding the sepals and bracts. C.

P. longipetala How.

ERICACEAE

Heath Family

Herbs (not ours) or shrubs or trees. Leaves simple, alternate or opposite or whorled; stipules none. Flowers mostly perfect. Calyx 4—5-parted or cleft, mostly persistent. Corolla regular or rarely somewhat irregular, mostly gamopetalous, of as many segments as the calyx. Stamens hypogynous, usually as many or twice as many as the corolla-segments; filaments mostly separate and free or nearly free from the corolla; anthers 2-celled; anther-cells often prolonged upward into tubes, opening by terminal pores or by longitudinal or terminal slits, often awned; pollen-grains united into 4's. Ovary superior in flower, often inferior in fruit, 2—5-celled; placentae central; style 1; stigma peltate or capitate or lobed. Fruit a capsule or berry or drupe. Seeds usually many but sometimes only 1 in each cell.

A. Leaves coriaceous, evergreen.

B. Leaves opposite.

C. Shrub of peat bogs; leaves not densely crowded, not imbricate, lanceolate to oval, 2—4 cm. long; flowers in terminal clusters; corolla saucer-shaped.

KALMIA (p. 296)

CC. Shrub of high mountains; leaves densely crowded, imbricate, almost scale-like, 2—4 mm. long; flowers solitary, axillary; corolla campanulate.

CASSIOPE (p. 297)

BB. Leaves alternate.

- D. Leaves 4—15 mm. long, linear or oblong; shrubs low, matted, on high mountains.
- E. Flowers in terminal clusters, yellowish or rose-colored; anthers awnless.
PHYLLODOCE (p. 297)
- EE. Flowers terminal, solitary, white; anthers 2-awned.
HARRIMANELLA (p. 297)
- DD. Leaves either 2 cm. or more long, or else wider for their length; shrubs various in form and altitude.
- F. Leaves strongly revolute; fruit a dry capsule.
- G. Leaves 7.5—15 cm. long; shrubs on dry soil; flowers rose-colored; corolla about 5 cm. long, campanulate.
RHODODENDRON (p. 296)
- GG. Leaves 3—7.5 cm. long; shrubs in peat bogs; flowers white; corolla less than 1 cm. long, either urn-shaped or of distinct petals.
- H. Corolla gamopetalous, urn-shaped; anthers 2-awned, capsule loculicidal; leaves without hairs beneath.
ANDROMEDA (p. 297)
- HH. Corolla of separate petals; petals widely spreading; anthers awnless; capsule septicidal; leaves with or without hairs beneath.
LEDUM (p. 295)
- FF. Leaves not revolute; fruit a berry or drupe, fleshy.
- I. Leaves entire, not over 7.5 cm. long; fruit red, 1—7-seeded.
ARCTOSTAPHYLOS (p. 298)
- II. Leaves serrulate or if entire 7.5—12.5 cm. long; fruit red or black, many-seeded.
- J. Shrub; bark not red; calyx becoming large and fleshy; leaves either ovate to cordate or else not over 3.7 cm. long; flowers solitary or racemose, in the axils; fruit red or black.
GAULTHERIA (p. 298)
- JJ. Shrub or tree; bark red; calyx remaining small; leaves oval or oblong and 7—12 cm. long; flowers paniculate, terminal; fruit red.
ARBUTUS (p. 298)
- AA. Leaves herbaceous, deciduous.
- K. Corolla of separate petals, copper-colored; flowers solitary, the parts in 5's.
CLADOTHAMNUS (p. 295)
- KK. Corolla gamopetalous, cylindric or urn-shaped or campanulate or funnelform, not copper-colored; flowers clustered, the parts in 4's or 5's.
- L. Flower-parts in 4's; corolla 5 mm. or less long, urn-shaped or cylindric, greenish or purplish; ovary 4-celled.
MENZIESIA (p. 296)
- LL. Flower-parts in 5's; corolla 8—50 cm. long, campanulate or funnelform, white or cream-colored; ovary 5-celled.
RHODODENDRON (p. 296)

CLADOTHAMNUS

COPPER-BUSH

Shrubs, erect, branching. Leaves alternate, deciduous. Flowers solitary, axillary or terminal, reddish, on leafy shoots. Sepals 5, somewhat foliaceous, as long as the petals. Petals distinct, spreading. Stamens 10; anther-cells opening longitudinally from tip. Style recurved. Capsule globose-depressed, 5—6-celled, 5—6-valved from above. Seeds many, oval; coat loose. (Gk. *klados*=a branch, *thamnos*=a shrub; the branches are numerous.) C. *C. pyrolaeiflorus* Bong.

LEDUM

LABRADOR TEA

Shrubs, low, in peat bogs or wet places. Leaves evergreen, alternate, persistent, more or less resinous-dotted, slightly fragrant. Flowers white, in mostly terminal fascicles; pedicels recurved in fruit. Calyx 5-lobed or -parted. Petals widely spreading.

Stamens 4—10; anther-cells opening by terminal pores. Placentae pendulous. Capsule oval or oblong, septicidal, 5-valved from the base upward. Seed slender; coat loose. (Gk. ledon=the name of the Rock Rose, *Cistus*, from the resemblance.)

A. Leaves lanceolate; leaf-margin revolute.

B. Leaves rusty-tomentose beneath. W.

L. groenlandicum Oeder

BB. Leaves glaucous and not hairy beneath. W.

L. columbianum Pip.

AA. Leaves oval or oblong, not hairy beneath; leaf-margin not revolute. E.

L. glandulosum Nutt.

RHODODENDRON

Shrubs (ours), or small trees, erect or spreading. Leaves evergreen or deciduous, alternate, entire or nearly so. Flowers white or rose-colored or purple, large, in terminal umbels or lateral fascicles. Calyx 5-parted or -lobed, minute to large. Corolla funnel-form or campanulate, 5-lobed, regular or slightly 2-lipped. Stamens 5 or 10; anther-cells opening by pores. Ovary 5—20-celled. Capsule 5—20-valved from tip. Seeds many, minute; coat loose, chaff-like. (Gk. rhodon=a rose, dendron=a tree; hence rose-tree.)

A. Leaves thick, coriaceous, evergreen; corolla rose-colored. W. C. (*R. macrophyllum*.)

P. californicum Hook. (Rhododendron)

AA. Leaves of ordinary thickness, not coriaceous, deciduous; corolla white or yellowish.

B. Leaves lanceolate or oblong; flowers in lateral clusters of 1—3; corolla 1.5—2 cm. long; stamens 10; capsule 6—8 mm. long. W. C. E. (*Azaleastrum albiflorum*; *Cladothamnus campanulatus*.)

R. albiflorum Hook. (Small Azalea)

BB. Leaves obovate-oblong; flowers in terminal umbels; corolla about 5 cm. long; stamens 5; capsule 16—25 mm. long. U. (*Azalea occidentalis*.)

R. occidentalis Gray (Large Azalea)

MENZIESIA

Shrubs, erect. Leaves alternate, deciduous, entire or serrulate. Flowers small, greenish or purplish, in terminal clusters. Calyx bristly-hairy, usually 4-lobed. Corolla cylindric to globose-urceolate, 4-toothed or -lobed. Stamens usually 8; anther-cells opening by oblique cracks or pores, awnless. Stigma 4-lobed or -toothed. Capsule subglobose or ovoid, 4-celled, septicidal, 4-valved. Seeds many, slender. (Honor of A. Menzies, surgeon and naturalist under Vancouver.) W. C. E. (*M. glabella*.)

M. ferruginea Sm. (Fool's Huckelberry)

KALMIA

SWAMP LAUREL

Shrubs, erect, in peat bogs. Leaves entire, coriaceous, evergreen, alternate or opposite (ours) or in whorls of 3, whitish beneath (ours), their margins reflexed (ours). Flowers in umbels or corymbs, or 1—3 in the axils. Calyx 5-parted or -divided. Corolla saucer-shaped, 5-lobed, with 10 pouches below the limb, 10 keeled from the pouches to the lobes and sinuses. Stamens 10; anthers awnless, in the corolla-pouches; anther-cells opening by pores. Capsule subglobose, obscurely 5-lobed, 5-celled, 5-valved

from tip, septicidal. Seeds many, small, subglobose. (Honor of P. Kalm, a Finnish botanist.) W. C. E. (*K. glauca*; *K. glauca microphylla*.)

K. polifolia Wang.

PHYLLODOCE

HEATHER

Shrubs, low, somewhat glandular. Leaves small, evergreen, linear-obtuse, crowded. Flowers long-pedicelled, nodding, mostly pink or blue or purple or yellowish, in terminal umbels; pedicels bracted at base. Calyx 4—6-parted. Corolla campanulate or ovoid, 5-lobed (ours). Stamens 8—12 (10 in ours). Anther-cells awnless, opening by oblique cracks. Stigma capitate or 4—6-lobed. Capsule 4—6-celled (ours 5), globose to short-oblong, septicidal, 4—6-valved (ours 5) to about the middle. Seeds many, minute. (Phyllodoce was a sea nymph mentioned by Virgil.)

A. Corolla red, campanulate. W. C. E. (*Bryanthus empetriformis*.)

P. empetriformis Don. (Red Heather)

AA. Corolla yellowish, ovoid. W. C. E.

P. glanduliflora Cov. (Yellow Heather)

CASSIOPE

MOSS HEATHER

Shrubs, low, matted. Leaves small, opposite, evergreen, sessile, densely imbricated or crowded, entire, apparently veinless, 4-ranked (in ours). Flowers solitary, peduncled, axillary, nodding, white or pink. Sepals 4 or 5, not bracted at base. Corolla campanulate, 4—5-lobed or -parted; lobes spreading or recurved. Stamens 8 or 10; anther-cells opening by pores, tipped with a recurved awn. Capsule globose or ovoid, 4—5-celled, 4—5-valved; valves 2-cleft at apex. Seeds many, minute. (Cassiope was the mother of Andromeda.)

A. Leaves furrowed on the back. C.

C. tetragona Don.

AA. Leaves keeled on the back. W. C. E.

C. mertensiana Don.

HARRIMANELLA

ALASKA HEATHER

Shrub, low, matted. Leaves small, linear, evergreen, crowded, sessile, entire, not in definite ranks or rows, decurrent. Flowers nodding, solitary on the ends of ordinary leafy branches. Calyx bractless; sepals distinct, not becoming fleshy, not exceeding the capsule in fruit. Corolla campanulate, vertically plaited at the base, 5-lobed; lobes pendent and overlapping. Stamens 10, 5 longer; anther-cells awned, opening by pores. Capsule globose. Seeds many, oblong. (Honor of E. H. Harriman, an American financier.) C.

H. stelleriana Cov.

ANDROMEDA

Shrubs, 1.5—9 dm. high (ours). Leaves coriaceous, evergreen, linear or oblong; in ours glabrous, glaucous, margins strongly revolute. Flowers small, white or pinkish, in terminal umbels. Calyx deeply 5-parted, persistent. Corolla globose-urceolate; teeth recurved. Stamens 10; anther-cells with recurved awns, opening by pores. Capsule subglobose, 5-celled, 5-angled, the top depressed, loculicidal, 5-valved. Seeds many. (Andromeda was a mythological Greek beauty, the daughter of Cassiope.) C.

A. polifolia L. (Bog Rosemary)

GAULTHERIA

Shrubs. Leaves wide, evergreen, alternate. Flowers small, nodding, either solitary in the leaf-axils or in axillary racemes. Calyx 5-cleft or -lobed. Corolla urn-shaped to campanulate. Stamens 10, anther-cells usually pointed or awned, opening by a pore at tip. Ovary 5-celled; style persistent. Fruit a berry composed of the fleshy calyx enclosing the ovary, depressed at the apex. Seeds many. (Honor of H. Gaulthier, a French naturalist, court physician at Quebec.)

A. Plant 3—30 dm. high; leaves 2.5—10 cm. long; corolla urn-shaped; filaments hairy; fruit black. W. C. shallon Pursh (Salal)

AA. Plant 0.5—2 dm. high; leaves 3.7 cm. or less long; corolla campanulate; filaments glabrous; fruit scarlet.

B. Leaves broadly ovate or subcordate, 2—3.7 cm. long; corolla twice as long as the calyx-lobes. W. C. E.

G. ovatifolia Gray

BB. Leaves oval or rounded, 1—2 cm. long; corolla little surpassing the calyx-lobes. C. E. (*G. myrsinites*.)

G. humifusa Rydb.

ARBUTUS

Shrubs or trees; bark red and peeling off. Leaves alternate, coriaceous, evergreen, oval or oblong (ours). Flowers small, pink or white, in panicles at the twig-ends. Calyx 5-lobed, small. Corolla globose to urn-shaped; teeth recurved. Stamens 10; anther-cells with reflexed awns, opening by pores. Ovary 5-celled; placentae central. Berry rough or granular, red (ours). Seeds rather many. The trailing arbutus of eastern U. S. goes to the genus *Epigaea*. (The Latin name.) W.

A. menziesii Pursh (Madrona)

ARCTOSTAPHYLOS BEARBERRY, MANZANITA

Shrubs or small trees. Leaves alternate, wide, coriaceous, evergreen, usually vertical by a twist of the petiole. Flowers small, white to light-red, in racemes or panicles; flower-clusters terminal, usually pendulous; pedicels with bracts and bracteoles. Calyx deeply 4—5-parted. Corolla urceolate; lobes recurved. Stamens 8 or 10; anther-cells with reflexed awns, opening by pores. Berry 4—10-celled, with a 1—7-seeded stone or with the cells more or less separate. (Gk. *arktos*=a bear, *staphyle*=a bunch of grapes; hence a bearberry.)

A. Plant trailing or with branches erect or ascending; ovary and fruit glabrous. (Bearberry or Kinnikinnick.)

B. Leaves obtuse or retuse; leaf-blade widest above the middle, gradually tapering to the petiole. W. C. E. (*A. intermedia*; *A. media*.)

A. uva-ursi Spreng.

BB. Leaves cuspidate; leaf-blade often widest below the middle, abruptly petioled. C.

A. nevadensis Gray

AA. Plant erect; ovary and fruit glabrous or hairy. (Manzanita.)

C. Ovary glabrous; leaves glabrous.

D. Leaves dark-green; pedicels glabrous; twigs glandular.

E. Bracts longer than the pedicels.

F. Leaves acute at both ends. U.

A. hispidula How.

- FF. Leaves obtuse at both ends. E.
 A. obtusifolia Pip.
 EE. Bracts shorter than the pedicels. U.
 A. manzanita Par.
 DD. Leaves whitish-green; pedicels glandular or pubescent; twigs not glandular, glabrous or short hairy. U. (*A. parvifolia*; *A. pulchella*.)
 A. viscida Par.
 CC. Ovary hairy at the top; leaves glabrous, whitish-green; twigs ashy-gray; pedicels minutely hairy, longer than the bracts. U. (*A. oblongifolia*.)
 A. cinerea How.
 CCC. Ovary densely pubescent or tomentose; leaves somewhat tomentose especially when young; pedicels glandular or hairy. W. C. (*A. intricata*; *A. strigosa*; *A. bracteata*.)
 A. tomentosa Dougl.

VACCINIACEAE

Huckleberry Family

Shrubs (ours) or small trees, erect or trailing. Leaves alternate, simple, evergreen or deciduous. Flowers small, white or pink, perfect, in clusters or solitary. Calyx 4—5-lobed or -cleft or -divided. Corolla 4—5-lobed, or rarely of separate petals. Stamens twice as many as the calyx-lobes; *epigynous* or on the base of the corolla; anthers often awned, opening by pores. Ovary inferior, 2—10-celled, placentae central; style filiform; stigma simple or minutely 4—5-lobed. Fruit (in ours) a berry. Seeds 2 to many, flat-tish.)

A. Corolla-segments less than half as long as the tube; plants erect or trailing, usually not in peat bogs, deciduous or evergreen, berry red or black or blue. VACCINIUM (p. 299)

AA. Corolla-segments distinct nearly or quite to the base; plants trailing, in peat bogs only, evergreen, berry red. OXYCOCCUS (p. 300)

VACCINIUM

HUCKLEBERRY

Leaves deciduous or evergreen. Flowers in racemes or clusters, rarely solitary in the leaf-axils. Calyx-persistent; tube globose to turbinate, not angled. Corolla urn-shaped to cylindric or campanulate. Ovary 4—5-celled or by false partitions 8—10-celled. Berry red or black. Seeds many. (L. vacca=a cow; perhaps because they are often pasture plants.)

A. Leaves deciduous; filaments glabrous; anthers 2-awned.

B. Flowers solitary; corolla 5-lobed; calyx entire to 5-cleft; leaves often not entire; twigs often angled.

C. Twigs terete; plants dwarf, caespitose, less than 5 dm. high; leaves mostly serrate.

D. Leaves bright green on both sides, rather thin; corolla ovate or oblong.

W. C. E. (*V. arbuscula*; *V. caespitosum cuneifolium*.)

V. caespitosum Michx. (Dwarf Bilberry)

DD. Leaves pale and glaucescent, thicker; corolla globose. W. C.

V. deliciosum Pip. (Sweet Bilberry)

CC. Twigs slightly to sharply angled; plants 10—20 dm. high when twigs are only slightly angled.

E. Leaves serrate or serrulate; plants 1—15 dm. high.

F. Leaves 4—8 mm. long; berries red; plant 1—4.5 dm. high. C. E. (*V. microphyllum*.) *V. scoparium* Leib.

FF. Leaves 12—16 mm. long; berries black; plant 1—3 dm. high. E. (*V. myrtillus* for our region.)

V. oreophilum Rydb.

- FFF. Leaves 25—50 mm. long; berries black; plant 3—15 dm. high. W. C. E. (*V. membranaceum rigidum*; *V. macrophyllum*.)
V. membranaceum Dougl.
- EE. Leaves entire or with a few irregular teeth; plants 10—40 dm. high.
 G. Leaves 6—17 mm. long; calyx 5-lobed; berry red. W. C.
V. parvifolium Sm. (Red Huckleberry)
- GG. Leaves 2.5—7.5 cm. long; calyx 10-toothed or -lobed; berry blue or black. W. C. (*V. alaskensis*.)
V. ovalifolium Sm.
- BB. Flowers in clusters of 2—4; corolla usually 4-lobed; calyx 4—5-parted; leaves entire; twigs terete.
 H. Leaf-veins prominent; leaves thick, obtuse or retuse. W. C. (*V. uliginosum mucronatum*.)
V. uliginosum L. (Bog Bilberry)
- HH. Leaf-veins obscure; leaves thinner, obtuse or acute. C. E.
V. occidentale Gray
- AA. Leaves evergreen, coriaceous; filaments hairy; anthers awnless.
 I. Plant erect, 6—24 dm. high; leaves 12—25 mm. long, acute, sharply serrate, not revolute; berry black, not bitterish. W.
V. ovatum Pursh (Evergreen Huckleberry)
- II. Plant prostrate, with erect shoots not over 2 dm. high; leaves 5—18 mm. long, obtuse or emarginate, entire or obscurely serrulate, revolute; berry dark red, bitterish. C. (*V. vitis-idaea* for our region.)
V. vitis-idaea minus Lodd. (Rock Cranberry)

OXYCOCCUS

CRANBERRY

Low, trailing (ours) or erect. Leaves in ours revolute, entire, 4—12 mm. long. Flowers axillary or terminal, on long filiform pedicels. Calyx-tube almost hemispheric. Petals or corolla-segments 4—5, revolute, narrow. Ovary 4—5-celled. Berry red, oblong or globose. Seeds many. (Gk. *oxus*=sour, *kokkus*=a berry; the berries are somewhat acid.) W. C. (*Vaccinium oxycoccus intermedium*; *O. palustris intermedium*.)
O. oxycoccus intermedium Pip.

PRIMULACEAE

Primrose Family

- Herbs, annual or perennial. Leaves alternate or opposite or whorled, or all basal. Flowers perfect, regular, variously arranged. Calyx 4—9-parted or -cleft, usually 5-parted, persistent or rarely deciduous. Corolla in ours gamopetalous or none (*Glaux*), rotate or funnelform or salverform or campanulate, segments as many as the calyx. Stamens as many as the corolla-lobes and opposite them, hypogynous or perigynous, on base of corolla-tube; sometimes also sterile filaments present. Ovary superior to inferior (*Samolus*), 1-celled; placenta central; style 1; stigma simple, capitate. Capsule 2—6-valved or rarely circumscissile or indehiscent; valves entire or 2-cleft. Seeds 1—many.
- A. Leaves opposite or whorled along elongated stems.
- B. Leaves sessile; flowers white or red or yellow.
 C. Flowers yellow; stem erect, 3—6 dm. high; leaves 2.5—5 cm. long, lanceolate.
 NAUMBURGIA (p. 302)
- CC. Flowers white or red; stem decumbent or diffuse, 1—3 dm. high; leaves 0.6—2.5 cm. long, not lanceolate.
 D. Plants of salt marshes, perennial; stem terete, very little branched if at all; flowers white or pink; petals none.
 GLAUX (p. 303)

- DD. Plants of cultivated ground, annual; stem 4-sided, much branched; flowers scarlet; petals present. ANAGALLIS (p. 303)
- BB. Leaves petiolate; flowers yellow. STEIRONEMA (p. 302)
- AA. Leaves either alternate or else in a basal or terminal tuft or whorl.
- E. Leaves in a basal rosette.
- F. Corolla rotate, 5-parted; stamens often united into a cone about the pistil. DODECATHEON (p. 303)
- FF. Corolla salverform or funnelform, 5-lobed; stamens not united.
- G. Corolla-tube equaling or exceeding the calyx; plant perennial.
- H. Capsule many-seeded; stamens exerted. PRIMULA (p. 301)
- HH. Capsule 1—2-seeded; stamens included. DOUGLASIA (p. 301)
- GG. Corolla-tube shorter than the calyx; plant annual. ANDROSACE (p. 301)
- EE. Leaves not all in a basal rosette, scattered along the stem or in a terminal whorl.
- I. Leaves or most of them 25 mm. or more long; flowers either not sessile or not solitary in the axils.
- J. Flowers few, terminal; not in racemes; stem simple; ovary superior; leaves tending to be in a terminal whorl; seeds few. TRIENTALIS (p. 302)
- JJ. Flowers many, in terminal paniced racemes; stem diffusely branched; ovary inferior; leaves all scattered along the stem; seeds many. SAMOLUS (p. 302)
- II. Leaves 4—6 mm. long; flowers sessile, solitary in the axils. CENTUNCULUS (p. 303)

PRIMULA

PRIMROSE

Perennial, scapose. Leaves all basal. Flowers large or small, in umbels or in involucrate or bracted racemes or whorls on a scape. Calyx tubular or funnelform or campanulate, persistent, often angled, 5-lobed. Corolla funnelform or salverform; tube equaling or exceeding the calyx. Stamens distinct. Capsule 5-valved at the summit. Seeds many, peltate. (Diminutive of *L. primus*=first; because some blossom in early spring.) E. (Apparently *P. broadheadae*.)

P. cusickiana Gray

DOUGLASIA

Perennial, depressed, tufted, small; stems somewhat woody, persistent. Leaves imbricated or crowded. Flowers solitary or somewhat umbellate, small. Calyx campanulate, 5-lobed, persistent. Corolla-tube equaling or exceeding the calyx, somewhat inflated above, its throat somewhat contracted and 5-arched beneath the sinuses. Stamens included, distinct. Ovary 5-ovuled. Capsule turbinate, 1—2-seeded. (Honor of D. Douglas, a Scotch botanist and collector in our region.)

A. Leaves canescent with forked hairs, 8—12 mm. long. C. E.

D. dentata Wats.

AA. Leaves glabrous or nearly so, 4—6 mm. long. W. C.

D. laevigata Gray

ANDROSACE

Annual (ours) or perennial, small. Leaves basal, tufted. Flowers small, white or pink. Calyx persistent, 5-lobed or -parted. Corolla salverform or funnelform; tube short, not exceeding the calyx. Stamens included, distinct. Capsule short, 5-valved from the apex. Seeds few to many. (Gk. andros=a man, sakos=a buckler or shield; probably referring to the form of the leaves.)

A. Leaves lanceolate or oblong-lanceolate, often toothed, 12—25 mm. long; calyx-tube white to reddish; calyx-segments subulate; capsule shorter than the calyx. E.

A. septentrionalis L.

AA. Leaves ovate, entire, 3—5 mm. long; calyx-tube green; calyx-segments triangular; capsule much longer than the calyx. W. E.

A. filiformis Retz.

SAMOLUS

BROOK-WEED

Glabrous; stems leafy, 15—45 cm. high (ours). Leaves alternate, entire; in ours ovate to spatulate, 2.5—7.5 cm. long. Flowers small, white, in simple or panicked (ours) racemes. Calyx persistent, 5-lobed; tube adherent to ovary below. Corolla epigynous, nearly campanulate; segments rounded. Staminodia 5 or none, in the sinuses of the corolla. Capsule ovate or spherical, 5-valved at top. Seeds many, minute. (Said to be from Celtic *san*=a greeting, *mos*=a pig; it was thought a cure for diseases of pigs.) E.

S. floribundus HBK.

STEIRONEMA

Perennial; stems leafy. Leaves opposite or whorled, simple. Flowers axillary, yellow, nodding; pedicels slender. Corolla rotate, without proper tube, deeply 5-parted; sinuses rounded; segments ovate, cuspidate-pointed, each involute or rolled about its stamen. Stamens alternating with 5 sterile filaments, distinct or nearly so. Capsule 10—20-seeded. (Gk. *steiros*=sterile, *nema*=a thread; referring to abortive stamens.)

A. Stems mostly simple; leaves ovate-lanceolate to oblong-ovate, minutely ciliate; corolla-lobes nearly twice as long as the calyx. C. E.

S. ciliatum Raf.

AA. Stems paniculately branched above; leaves lanceolate to linear-lanceolate, not ciliate; corolla-lobes but little longer than the calyx. U.

S. laevigatum How.

NAUMBURGIA

Perennial, erect, 3—6 dm. high (ours). Leaves opposite, entire, the lower ones mere scales; in ours sessile, 2.5—5 cm. long, lanceolate, punctate. Flowers small, yellow, in axillary spikes or heads. Calyx 5—7-divided; segments linear. Corolla-segments narrow, almost distinct. Stamens exserted; staminodia tooth-like, 1 at each sinus of the corolla. Capsule 5—7-valved. Seeds few. (Probably in honor of a Mr. Naumberg.)

C. E.

N. thysiflora Duby (Tufted Money-wort)

TRIENTALIS

STAR-FLOWER

Perennial, glabrous; stem simple, 2.5—15 cm. high (ours), from a subterranean tuber (ours). Leaves simple, alternate but mostly clustered at the top. Flowers white or pink; pedicels filiform. Corolla completely rotate, without a tube, deeply parted; segments 5—7. Capsule about 5-valved, seeds few, rather large, white. (L. *trientalis*=pertaining to 1/3; because they are about 1/3 foot high.)

A. Leaves crowded near the stem-tip; woods plant; pedicels shorter than the leaves. W.

C. E.

T. latifolia Hook.

AA. Leaves scattered along the stem; bog plant; pedicels longer than the leaves. W.

C. E.

T. arctica Fisch.

GLAUX

BLACK SALTWORT

Small; ours glabrous, in salt marshes; stems leafy. Leaves opposite, entire, fleshy; in ours sessile, oval to linear-oblong, 6—12 mm. long. Flowers small, axillary, white or pink. Calyx 5-parted; segments petal-like, about twice as long as the tube; tube campanulate. Petals none. Stamens at base of calyx, alternate with the calyx-lobes. Capsule 5-valved at the top. Seeds few. (Gk. *glaukos*=sea-green, hence glaucous; referring to the color of the plant.) W.

G. maritima L.

ANAGALLIS

Annual (ours) or perennial; stems in ours 4-angled, 1—3 dm. long. Leaves opposite or whorled or the upper ones alternate; in ours ovate, sessile, 12—25 mm. long. Flowers small, axillary, red (ours), or white or blue. Calyx 5-parted, persistent. Corolla rotate; segments in ours lanceolate, acute, minutely denticulate or glandular-ciliate. Capsule globose. Seeds many, minute. (Gk. *anagelao*=to laugh; thought to counteract melancholia.) W.

A. arvensis L. (Poor-man's Weather-glass)

CENTUNCULUS

CHAFF-WEED

Annual, glabrous, ours in moist places; stems in ours 5—15 cm. long. Leaves in ours alternate, ovate to obovate or spatulate-oblong, 4—6 mm. long, all but the lowest sessile. Flowers minute, solitary in the axils of the middle leaves. Calyx 4—5-parted, longer than the corolla, persistent; segments acute, linear. Corolla small; tube subglobose; teeth entire, acute. Seeds many, minute. (Diminutive of L. *cento*=a patch; probably referring to its manner of growth.) C. E.

C. minimus L.

DODECATHEON

SHOOTING STAR

Perennial, low. Leaves entire or merely serrate or dentate. Flowers few or numerous, in an umbel terminating a naked scape. Calyx deeply 4—5-lobed; lobes reflexed in flower, erect in fruit. Corolla 4—5-parted; tube very short, thickened and dilated at throat; segments long, narrow, reflexed. Seeds many. (Gk. *dodeka*=12, *theos*=god; the name of the primrose, which the gods were thought to protect.)

A. Flower-parts normally in 4's. C. E.

A. tetrandrum Suks.

AA. Flower-parts normally in 5's.

B. Herbage glabrous.

C. Leaves entire.

D. Filaments free or anthers sessile.

E. Leaves broadly elliptic to obovate. W. (*D. hendersoni*.)

D. latifolium Pip. (Mosquito-bills)

EE. Leaves narrower.

F. Leaves 2—5 cm. long; scape 0.7—1.5 dm. long. E.

D. campestre How.

FF. Leaves 5—12 cm. long; scape 1—2 dm. long. C. E. (*D. conjugens leptophyllum*.)

D. conjugens Gr.

FFF. Leaves 20—30 cm. long; scape 4—6 dm. long. E.

D. dispar Nels.

- DD. Filaments united into a tube at least $\frac{1}{2}$ as long as the anthers.
 G. Filaments black; capsule opening by a lid. C.
D. alpinum Gr.
- CG. Filaments yellow; capsule opening by valves from the tip.
 H. Involucre-bracts oblong to spatulate; anthers about equaling the stamen-tube; capsule splitting into halves. E.
D. salinum Nels.
- HH. Involucre-bracts lanceolate; anthers at least twice as long as the stamen-tube, capsule opening by 5 short teeth. W. E. (*D. vulgare*.)
D. pauciflorum Gr.
- CC. Leaves not entire.
 I. Leaves dentate, ovate, 5—10 cm. long; petals white, each with 2 purple spots at base; capsule opening by valves from the tip. C. E.
D. dentatum Hook.
- II. Leaves crenate, longer for their width, 12—25 cm. long; petals purple thruout; capsule opening by a lid. W. C. E. (*D. viviparum*.)
D. jeffreyi VanH.
- BB. Herbage puberulent or viscid-puberulent.
 J. Filaments yellow; united into a tube; capsule opening by valves from the tip. E. (*D. puberulum*.) *D. cusickii* Gr.
- JJ. Filaments black, not united; capsule opening by a lid. E.
D. viscidum Pip.

PLUMBAGINACEAE (Armeriaceae) Lead-wort Family

Herbs, erect, perennial. *Leaves* basal and tufted (ours). *Flowers* small, perfect, regular, clustered. *Calyx* tubular or funnellform, 5-toothed; tube 5—15-ribbed (ours 10). *Petals* 5, distinct or nearly so, clawed. *Stamens* 5, opposite the petals, hypogynous. *Ovary* superior, 1-celled; styles 5, separate or united. *Fruit* a utricle (ours) or akene or rarely dehiscent, enclosed by the calyx. *Seed* 1.

STATICE (Armeria)

Scapes slender, mostly naked, 1—5 dm. high (ours). *Leaves* persistent, narrow, without petiole; in ours 1-veined, fleshy, linear, entire, 25—75 mm. long. *Flowers* short-pedicelled or sessile, in heads; heads dense, terminal, subtended by scarious bracts, the lower bracts forming a sort of involucre to the head, the 2 lowest bracts reflexed and more or less united into a sheath. *Calyx* scarious. *Petals* in ours white or pink or purple. *Filaments* adherent to petal-bases. *Styles* united at base. (Gk. statizo=to stop; thought to cure diarrhoea.) W. (*A. vulgaris*.)

S. armeria L. (Thrift)

OLEACEAE

Olive Family

Trees (ours) or shrubs. *Leaves* opposite (ours) or rarely alternate, simple or odd-pinnate (ours); leaflets 5—7 (ours), entire (ours) or dentate; stipules none. *Flowers* regular, perfect or polygamous or dioicous (ours); in terminal or axillary panicles or cymes or fascicles. *Calyx* small (ours) or none. *Corolla* gamopetalous or polypetalous or none (ours). *Stamens* 2—4, on the corolla; filaments usually short. *Ovary* superior, 2-celled; cells few-ovuled. *Fruit* a capsule or samara (ours) or berry or drupe.

FRAXINUS

ASH

Flowers small, greenish, in fascicles, appearing before or with the leaves. Calyx 4-cleft (ours) or irregularly toothed or entire. Stigma 2-cleft. Fruit flat, long-winged at one end. Seeds 1—2, oblong. (Gk. *phraxis*=a separation; because the wood splits easily.) W. C. E.

F. oregana Nutt. (Oregon Ash)

GENTIANACEAE

Gentian Family

Herbs, bitter, mostly quite glabrous. *Leaves opposite*, or rarely *whorled* or *alternate*, *entire* or *nearly so*, or mere scales (not ours); *stipules none*. *Flowers regular*, perfect, in terminal or axillary clusters, or solitary at the ends of stems or branches. Calyx persistent, 4—12-toothed to -divided, or of 2 sepals (not ours). Corolla gamopetalous, funnel-form or campanulate or club-shaped or rotate; lobes as many as the sepals. *Stamens as many as corolla-lobes*, *alternate with them*, on the tube or throat. *Ovary superior* (ours), 1-celled or partly 2-celled; style 0—1; stigmas 1—2. Capsule mostly dehiscent by 2 valves. Seeds many.

A. Flowers yellow, the parts in 4's.

MICROCALA (p. 305).

AA. Flowers either not yellow or else the parts in 5's.

B. Corolla longer than rotate.

C. Style filiform, deciduous; anthers twisted when old. CENTAURIUM (p. 305)

CC. Style short and persistent or none; anthers not twisted when old.

GENTIANA (p. 306)

BB. Corolla rotate.

D. Style very short or none; flower-parts in 5's.

SWERTIA (p. 307)

DD. Style slender, long; flower-parts in 4's.

FRASERA (p. 307)

MICROCALA

Annual, ours 5—7.5 cm. high. Leaves opposite, entire, sessile; in ours 2—3 pairs, 4—6 mm. long. Flowers yellow. Calyx 4-toothed, 4-angled. Corolla short-salverform, about 6 mm. long (ours). Style filiform, deciduous; stigma of 2 fan-shaped and at first united lobes. Seeds many. (Gk. *mikros*=small, *kalos*=beautiful; hence a small beauty.) U. *M. quadrangularis* Griseb.

CENTAURIUM (Centaury, Erythraea) CENTAURY

Low, mostly annual or biennial. Leaves entire, sessile. Flowers usually many, pink or white or yellow (not ours), in cymes or spikes. Calyx tubular, 4—5-lobed or -divided; segments narrow, keeled. Corolla salverform. Filaments slender. Ovary 1-celled; placentae more or less intruded; style filiform; stigma 2-lobed; lobes oblong to fan-shaped. Capsule oblong-obovoid to fusiform, 2-valved. (L. *centum*=100, *aurum*=gold or gold-pieces; referring to the medicinal value.)

A. Stem 2.5—5 cm. high; leaves 2—6 mm. long, lanceolate. W.

C. minimum (How.)

AA. Stem more than 5 cm. high; leaves more than 6 mm. long, not lanceolate.

B. Basal leaves in a rosette. W. (*C. centaurium*.)

C. umbellatum Gileb. (Bitter-herb)

BB. Basal leaves not in a rosette.

C. Corolla-lobes obtuse or retuse; pedicels mostly shorter than the flowers. W.

E. (*E. curvistamenea*.) *C. muhlenbergii* Wight

CC. Corolla-lobes obtuse or acute; pedicels much longer than the flowers.

D. Corolla-lobes obtuse; seeds globose, 0.4—0.5 mm. long. C. E. (*E. douglasii*.) C. *exaltatum* Wight (Tall Centaury)

DD. Corolla-lobes acute; seed oblong, 0.6—0.7 mm. long. E. C. *nuttallii* (Wats.)

GENTIANA

GENTIAN

Erect or nearly so, annual or perennial. Leaves opposite or rarely whorled, entire, sessile or short-petioled. Flowers blue or purple or yellow or white. Calyx tubular, 4—7-cleft but usually 5-cleft. Corolla tubular or clavate or campanulate or salverform or funnelform or rotate (not ours); lobes entire or fimbriate or erose. Style short or none; stigma cleft into 2 lamellae. (Honor of King Gentius of Illyria, who is said to have discovered the medicinal value.)

A. Corolla plicate in the sinuses, the folds more or less extended into thin teeth; perennial.

B. Corolla yellow; perennial by off-sets; anthers introrse. W.

G. *douglasiana* Bong. (Yellow Gentian)

BB. Corolla white or blue; root perennial; anthers extrorse.

C. Stems 5—10 cm. long; stem-leaves 2—4 pairs. C.

G. *newberryi* Gray (Dwarf Gentian)

CC. Stems 15 cm. or more long; stem-leaves 6—many pairs.

D. Upper leaves forming an involucre about the 1—5-flowered cluster.

E. Flower 1. W. C. E. (*G. gormani*; *G. bisetae*.)

G. *calycosa* Griseb.

EE. Flowers 1—5. W. C. E.

G. *parryi* Engelm.

DD. Upper leaves not forming an involucre.

F. Corolla oblong-campanulate, its lobes narrowed at base, its appendages entire.

G. Plant 3—6 dm. high; leaves lanceolate to linear, 3-veined; seed unappendaged. U. (*G. orfordii*.)

G. *menziesii* Griseb.

GG. Plant 6—12 dm. high; leaves ovate to lanceolate, 3—7-veined; seed with acuminate appendage. W.

G. *septrum* Griseb.

FF. Corolla funnelform, its lobes not narrowed at base, its appendages lacinate-toothed or -cleft.

H. Stem 2—3 dm. high; leaves oblong to linear; bracts lanceolate to linear; calyx-lobes linear to narrowly lanceolate; corolla 2—2.5 cm. long. E. G. *affinis* Griseb.

HH. Stem 3—6 dm. high; leaves ovate to oblong; bracts oblong to ovate; calyx-lobes oblong to ovate-lanceolate; corolla 3—3.5 cm. long. E. G. *oregana* Engelm.

AA. Corolla without extended plaits or lobes or teeth in the sinuses; annual.

I. Corolla 25—50 mm. long, its lobes often fimbriate or erose.

J. Calyx-lobes acutely keeled, 2 larger and narrower. E. (*G. serrata holopetala*.) G. *serrata* Gun.

JJ. Calyx-lobes not keeled, all about equal. C.

G. *simplex* Gray

II. Corolla 5—7 mm. long, its lobes entire.

K. Leaves 4—12 mm. long; calyx-lobes ovate to oblong; corolla 5—8 mm. long.

E. G. *tenella* Rottb.

- KK. Leaves 12—50 mm. long; calyx-lobes lanceolate to linear; corolla 10—17 mm. long. W. C. E. (*G. anisosepala*; *G. stricta*.)
G. acuta Michx.

SWERTIA

CHIRETTA

Perennial; stems simple. Leaves opposite or alternate, at least the lower petioled. Flowers many, in thyrsoid racemes or panicles. Corolla rotate, white to blue or purple, in ours 4—5-lobed. Style very short or none; stigma 2-lobed or 2-lamellate. Capsule ovate; placentae not intruded. (Honor of E. Swert, a Dutch bulb-grower.) E. (*S. obtusa* for our region.)
S. palustris Nels.

FRASERA

COLUMBO

Smooth or puberulent; stems erect or nearly so, simple or branched. Leaves opposite or whorled. Flowers many, in thyrsoid or paniculate cymes or racemes. Corolla rotate, 4-parted; lobes with 1—2 fringed glands and sometimes a fimbriate crown at base. Stamens on the very base of the corolla. Ovary ovate; placentae not intruded; style slender and elongated; stigma small, 2-lobed or nearly entire. Capsule ovate. Seeds flattish, usually smooth and margined. (Honor of John Fraser, an American plant-collector.)

A. Leaves with firm white border; plants 6 dm. or less high.

B. Whole plant puberulent; corolla-lobes acuminate. E.

F. albicaulis Griseb.

BB. Whole plant glabrous; corolla-lobes obtuse or acute. E. (*F. cusickii*.)

F. nitida Benth.

AA. Leaves not bordered; plants 6—12 dm. high.

C. Leaves in whorls of 2 or 3; stem-leaves reaching 1 dm. long; corolla blue-purple, with 1 gland on each lobe; capsule flattened parallel to the partition; seed globose.

E. (*F. thyrsiflora*.) *F. fastigiata* Hel.

CC. Leaves in whorls of 4 or 6; stem-leaves reaching 2—3 dm. long; corolla greenish with 2 glands on each lobe; capsule flattened perpendicular to the partition; seed oblong. E.

F. speciosa Dougl.

MENYANTHACEAE

Buck-bean Family

Herbs, perennial, aquatic or in marshes; rhizome creeping. Leaves basal or alternate, glabrous, entire (not ours) or crenate or 3-foliolate. Flowers clustered, regular, perfect. Calyx deeply 5-parted, persistent. Corolla funnelform to rotate, 5-lobed or -cleft. Stamens 5, on the corolla, alternate with the corolla-lobes; filaments filiform (ours); pollen-grains 3-angled. Ovary superior or half-superior, 1-celled, the 2 placentae sometimes intruded. Fruit a capsule, sometimes indehiscent, oval (ours). Seeds few, flattish, smooth.

A. Leaves simple; corolla-lobes entire; style short or none.

NEPHROPHYLLIDIUM (p. 307)

AA. Leaves 3-foliolate; corolla-lobes fimbriate; style subulate.

MENYANTHES (p. 308)

NEPHROPHYLLIDIUM

DEER-CABBAGE

Leaves alternate, basal, simple, deciduous, reniform, deeply and coarsely crenate, 7-veined from the base, long-petioled. Flowers white, in cymes on scapes. Calyx-tube short-funnelform; segments ovate, not ciliate, but slightly involute, their margins

coarsely erose. Style short or almost none. (Gk. nephros=the kidneys, phyllon=a leaf, idios=peculiar; hence peculiar kidney-shaped leaf.) W.

N. crista-galli Gilg.

MENYANTHES

BUCK-BEAN

Leaves alternate, long-petioled, compound, 3-foliolate; leaflets oblong or obovate, entire or repand, obtuse, sessile, pinnately veined, 2.5—7.5 cm. long. Flowers white or purplish, racemose or paniculate, on long lateral scapes or peduncles. Calyx-segments oblong or lanceolate. Corolla short-funnelform; lobes fimbriate or bearded within, spreading. Style subulate. Capsule indehiscent or finally rupturing. (Gk. mene=a month, anthos=a flower.) W. C. E. *M. trifoliata* L.

APOCYNACEAE

Dog-bane Family

Herbs (ours) or shrubs or trees, sometimes vines (not ours), perennial; *juice* mostly *milky* (so in ours). *Leaves* simple, alternate or *opposite* (ours) or whorled; stipules none. Flowers perfect, regular, solitary or cymose or paniculate, the parts in 5's. Calyx inferior, persistent. Corolla gamopetalous, lobed. Stamens on the corolla, as many as its lobes, alternate with them. Pollen grains often sticky. *Carpels* 2, *distinct* (ours) or united, superior, adherent to the calyx at base; ovules numerous (ours) or few; style simple or 2-divided. Fruit of 2 follicles (ours). *Seed bearded* (ours).

APOCYNUM

DOG-BANE

Leaves entire. Flowers small, white or pink, in terminal or axillary cymes. Calyx 5-parted; segments acute. Corolla campanulate, 5-lobed; tube with 5 small appendages inside alternate with the stamens. Stamens on base of corolla; anthers united around the stigma and slightly adhering to it. Stigma ovoid, obtuse, obscurely 2-lobed. Follicles slender, elongated, terete. Seeds many, small, long-bearded at apex. (Gk. apo=from, kyon=dog; some species are said to be poisonous to dogs.)

A. Leaves oval to orbicular; corolla-lobes spreading or recurved.

B. Leaves glabrous. W. E. (*A. androsaemifolium pumilum*.)

A. androsaemifolium L. (Spreading Dog-bane)

BB. Leaves puberulent. E. (*A. androsaemifolium detonsum*.)

A. detonsum (Pip.)

AA. Leaves oval to lanceolate; corolla-lobes erect.

C. Calyx and bracts ciliolate. E.

A. ciliolatum Pip.

CC. Calyx and bracts entire, not ciliolate.

D. Cymes large, many-flowered. E.

A. cannabinum L. (Indian Hemp)

DD. Cymes small, few-flowered. E.

A. suksdorfii Gr.

ASCLEPIADACEAE

Milkweed Family

Herbs (ours) or shrubs, *perennial*, often vines (not ours); *juice* mostly *milky* (so in ours). *Leaves* alternate (not ours) or *opposite* or *whorled*; stipules none. Flowers regular, perfect, mostly in umbels (so in ours). Calyx-tube very short or none; segments 5. Corolla rotate to funnelform, 5-lobed or -cleft. *Crown between stamens and corolla* 5-lobed or -parted. Stamens 5, on corolla near base; filaments short, stout, monadelphous (ours); anthers united around the stigma; pollen cohering in waxy or gran-

ular masses, 1—2 masses in each sac, connected with the stigma in 2's or 4's by 5 glandular bodies alternate with the anthers. *Carpels 2, superior, their ovaries and styles distinct*, their stigmas united into a head. Fruit of 2 follicles. *Seeds many (ours), flattish, long-bearded.*

A. Leaves cordate-clasping at base; hoods of the crown between stamens and corolla without horns inside. ACERATES (p. 309)

AA. Leaves not clasping; hoods of the crown between stamens and corolla each with a horn inside. ASCLEPIAS (p. 309)

ACERATES

GREEN MILKWEED

Herbs, perennial; juice milky. Leaves in ours opposite, thick, ovate or ovate-lanceolate, 5—13 cm. long. Flowers green or purplish. Calyx 5-parted or -divided; segments acute, glandular within. Corolla deeply 5-cleft. Crown neither horned nor crested within, of 5 hoods; hoods involute-concave or somewhat pitcher-shaped. Stamens alternate with the petals; pollen-masses 1 in each sac, oblong, pendulous. Stigma 5-lobed. (Gk. a=without, kerates=horns; they lack the stamen-horns of *Asclepias*.)

U. (*Gomphocarpus cordifolius*.) A. *cordifolia* Benth.

ASCLEPIAS

MILKWEED

Leaves entire. Calyx 5-parted or -divided, usually small; segments or sepals acute, often glandular within. Corolla deeply 5-parted. Crown of 5 hoods; hoods erect or spreading, concave, each with a horn within; horn subulate, incurved. Filaments united into a tube; pollen-mass 1 in each sac, pendulous. Stigma nearly flat, 5-angled or -lobed. Follicles usually thick, acuminate. (The Greek name of the god of healing; some of the plants are medicinal.)

A. Leaves white-tomentose; stem 6—18 dm. high; leaves oval to oblong. E.

A. *speciosa* Torr. (Woolly Milkweed)

AA. Leaves glabrous; either the stem only 1.5—3 dm. high or else the leaves linear to lanceolate.

B. Stems erect, 6—15 dm. high; leaves many, in whorls of 2—6, linear to lanceolate, 7.5—15 cm. long; corolla-lobes 4 mm. long; follicles 5—7.5 cm. long. W.

E. A. *mexicana* Cav. (Whorled Milkweed)

BB. Stem decumbent, 1.5—3 dm. high; leaves 6—8, opposite, rounded-ovate, 2.5—5 cm. long; corolla-lobes 10 mm. long; follicles 2.5—5 cm. long. E.

A. *cryptoceras* Wats. (Dwarf Milkweed)

CONVOLVULACEAE Morning-glory Family

Herbs (ours) or shrubs or trees; juice often milky. Stems prostrate or twining or erect (not ours). Leaves none or mere scales, or alternate; stipules none. Flowers axillary, regular, the parts in 4's or 5's. Sepals usually distinct, persistent. Corolla-limb entire or lobed. Stamens as many as the corolla-segments and alternate with them, usually low down on the corolla-tube. Ovary 2—6-celled; cells 1—2-ovuled; styles 1 or 2 or 4; stigma terminal or introrse. Fruit a capsule or sometimes fleshy. Seeds large.

A. Plants green, not parasitic; leaves ordinary, wide. CONVOLVULUS (p. 310)

AA. Plants red or yellow, without green, parasitic; leaves mere scales.

CUSCUTA (p. 310)

CONVOLVULUS

BIND-WEED

Herbs not parasitic, green. Leaves alternate, wide, simple. Flowers mostly solitary in the leaf-axils. Sepals nearly equal or 1 larger, with or without a pair of bracts at base. Corolla campanulate to funnelform, somewhat 5-lobed or -angled at margin, deeply plaited down the sinuses in the bud. Stamens included. Capsule globose, 2-celled, 2-ovuled. Seeds usually 2. (*L. convolvere* = to entwine; they are twining plants.)

- A. Peduncles with 2 bracts just beneath the calyx and reaching or enclosing it; stigmas linear to ovate.
- B. Leaves somewhat cuneate at base; basal leaf-lobes small or none. W. (*C. nyctagineus*.) *C. californicus* Choisy
- BB. Leaves not at all cuneate at base.
- C. Leaves reniform, entire or with obscure angles, fleshy; stem trailing or creeping. W. *C. soldanella* L. (Fleshy Bind-weed)
- CC. Leaves not reniform, distinctly angled, not fleshy; stem mostly twining.
- D. Stigma oblong to linear; leaf-lobes at base entire; peduncles often 2-flowered. W. (*C. polymorphus*.)
- C. occidentalis* Gray
- DD. Stigma ovate to oblong; leaf-lobes at base entire to 2—3-lobed; peduncles all 1-flowered. E. (*C. sepium americanus*.)
- C. sepium* L. (Hedge Bind-weed)
- AA. Peduncles without bracts near the calyx, but often with them further down; stigmas filiform. W. E. *C. arvensis* L. (Field Bind-weed)

CUSCUTA

DODDER

Herbs, parasitic, without green color, twining. Leaves mere scales, alternate. Flowers small, whitish, in cymose clusters. Calyx 4—5-parted or -cleft. Corolla campanulate or short-tubular or urceolate, mostly with lacerate scales inside at the throat. Stamens in throat of corolla 1 above each scale (when present). Ovary globose, 2-celled, 4-ovuled; styles distinct or rarely united. Seeds 1—4. (Latin name; from *kechout*, the Arabic name.)

- A. Corolla-scales fringed; stigmas capitate.
- B. Capsule pointed.
- C. Flowers with pedicels; dry corolla enveloping the capsule; in fields and waste places. E. *C. indecora* Choisy (Pretty Dodder)
- CC. Flowers sessile; dry corolla not enveloping the capsule, in salt marshes along the coast. W. (*C. salina*.)
- C. squamigera* Pip. (Salt-marsh Dodder)
- BB. Capsule globose.
- D. Flowers sessile; style shorter than the ovary. E. *C. arvensis* Bey. (Field Dodder)
- DD. Flowers with pedicels; style as long or longer than the ovary.
- E. Stems coarse; calyx-lobes obtuse; corolla-lobes obtuse or rounded. E. *C. cephalanthi* Engelm. (Sage Dodder)
- EE. Stems fine; calyx-lobes acute; corolla-lobes lanceolate-subulate. C. E. *C. californica* Choisy
- AA. Corolla-scales crenulate; stigmas filiform.
- F. Calyx-lobes not keeled; corolla-lobes triangular, acute. W. *C. epithymum* Murr. (Alfalfa Dodder)
- FF. Calyx-lobes keeled; corolla-lobes ovate, obtuse. E. *C. planiflora* Ten.

POLEMONIACEAE

Phlox Family

Herbs or shrubs, annual or perennial; juice colorless. Leaves simple or compound, often dissected; stipules none. Flowers perfect, regular; calyx 5-lobed to -parted, persistent. Corolla 5-lobed. Stamens 5, distinct, inserted in the corolla-tube, alternate with the corolla-lobes. Ovary superior; style 1, 3-lobed or -cleft. Fruit a capsule, 3-celled, loculicidal, usually with a thick placental axis. Seeds few to many, small, often mucilaginous when wet.

- A. Calyx distended and at length burst by the capsule; leaves opposite or alternate.
- B. Leaves opposite, entire; plant perennial; corolla salverform. PHLOX (p. 311)
- BB. Not as above in all of the first 3 points; corolla often not salverform. GILIA (p. 312)
- AA. Calyx not distended nor burst by the capsule; leaves alternate.
- C. Calyx-teeth spine-tipped; leaves compound; stamens inserted at unequal heights in the corolla-tube. NAVARRETIA (p. 314)
- CC. Calyx-teeth herbaceous, not spine-tipped.
- D. Leaves compound, pinnate; leaflets entire (except *P. confertum*); stamens inserted equally high in the corolla-tube; corolla rotate to funnelform. POLEMONIUM (p. 316)
- DD. Leaves simple, entire or pinnately or palmately dissected; stamens inserted at unequal heights in the corolla-tube; corolla salverform to funnelform. COLLOMIA (p. 315)

PHLOX

PHLOX

Herbs, erect or diffuse. Leaves opposite or some of the upper ones alternate, entire. Flowers large, white or red or blue or purple, in terminal cymes or cymose panicles. Calyx tubular or tubular-campanulate, 5-ribbed; segments acute or acuminate, mostly scarious-margined. Corolla salverform; tube narrow; segments obovate or orbicular or obcordate, spreading. Stamens inserted at unequal heights. Capsule ovoid, at length bursting the calyx-tube. Seed not emitting spiral threads when wetted. (Gk. phlox = flame; the name of some flame-colored flower.)

- A. Densely tufted, mostly forming cushion-like mats or tufts; leaves crowded up to the flowers; flowers solitary in most species.
- B. Flowers solitary, the annual growth 1-flowered.
- C. Stem and leaves with woolly or cob-webby hairs.
- D. Leaves densely white-woolly except at tip. E. *P. lanata* Pip.
- DD. Leaves somewhat woolly but not densely so. E. *P. canescens* T. & G.
- CC. Stem and leaves without woolly or cob-webby hairs except sometimes at leaf-base.
- E. Calyx slightly woolly; leaves often woolly at base.
- F. Herbage finely glandular. E. *P. rigida* Benth.
- FF. Herbage not glandular.
- G. Leaves involute, glabrous. E. *P. depressa* Rydb.
- GG. Leaves plain, often ciliate.
- H. Leaves all needle-shaped; style half as long as the corolla. C. E. (*P. douglasii andicola*.) *P. douglasii* Hook.

- HH. Leaves not at all needle-shaped; style nearly as long as the corolla. W. C. E.
P. diffusa Benth.
- EE. Calyx not at all woolly; leaves hispid-ciliate.
 I. Leaves 5—6 mm. long, grooved. W. C.
P. condensata Nels.
- II. Leaves 8—14 mm. long, usually not grooved. C. E.
P. caespitosa Nutt.
- BB. Flowers not solitary, the annual growth 1—5-flowered. E.
P. aculeata Nels.
- AA. Loosely tufted, or many-stemmed from an intricate base; leaves not crowded, spreading, little or not at all fascicled in the axils; flowers in cymes, slender peduncled.
 J. Style long, usually equalling the corolla-tube.
 K. Leaves broadly lanceolate to ovate. U.
P. adsurgens Torr.
- KK. Leaves narrowly-lanceolate to linear.
 L. Inflorescence not glandular. E. (*P. linearifolia*.)
P. longifolia Nutt.
- LL. Inflorescence glandular.
 M. Only the inflorescence viscid-pubescent.
P. viridis Nels.
- N. Leaves 1 mm. wide. E.
 NN. Leaves 2—3 mm. wide. E.
P. stanburyi Hel.
- MM. More of the plant than the calyx viscid-pubescent.
 O. Hairs minute; plant glandular-puberulent. E.
P. puberula Nels.
- OO. Hairs coarser; whole plant viscid-pubescent. E.
P. viscida Nels.
- JJ. Style short, not longer than the ovary, much shorter than the corolla-tube.
 P. Upper leaves of the flowering stems dilated at base.
 Q. Leaves linear, soft; cymes loose. E. (*P. speciosa elatior*; *P. speciosa sabini*.)
P. speciosa Pursh
- QQ. Leaves lanceolate, rigid; cymes dense. E.
P. lanceolata Nels.
- PP. Upper leaves of the flowering stems not dilated at base.
 R. Leaves linear or narrowly lanceolate. C. E.
P. whitedii Nels.
- RR. Leaves lanceolate. E.
P. occidentalis Dur.

GILIA (Linanthus)

GILIA

Herbs or shrubs. Leaves opposite or alternate, entire or cleft or dissected, pinnately or palmately veined. Flowers solitary or cymose or thyrsoid or paniculate or capitate. Calyx campanulate or tubular. Corolla funnelform or tubular or campanulate or salverform; lobes ovate or obovate or oblong. Stamens equally or unequally inserted on the corolla. Capsules ovoid or oblong, at length bursting the calyx. Seed mucilaginous when wet, in some species giving off spiral threads. (Honor of F. Gil, a Spanish botanist.)

- A. Shrubs; leaf-segments needle-shaped, alternate; corolla salverform, yellow. E.

- (*Cantua pungens*; *Cantua pungens hookeri*; *Cantua pungens squarrosa*; *G. pungens hookeri*; *G. pungens squarrosa*.) *G. pungens* Benth. (Prickly Gilia)
- AA. Herbs.
- B. Leaves opposite, or sometimes a few of the upper ones alternate.
- C. Leaves entire.
- D. Plant leafless from cotyledons to inflorescence. E.
G. nudicaulis Gray (Scapose Gilia)
- DD. Plant with leaves on the stem.
- E. Stem branched from the base. C. E. (*G. humilis glabella*; probably *Microsteris diffusa*.) *G. humilis* Pip.
- EE. Stem simple below. (See P.)
- CC. Leaves dissected into filiform segments.
- F. Flowers crowded into a head-like leafy cluster; corolla salverform and the tube long-filiform (funnel-form in *G. nuttallii*.)
- G. Perennial, woody at base. C. E.
G. nuttallii Gray
- GG. Annual; herbaceous thruout.
- H. Plant 2.5—7.5 cm. high; corolla-tube 20—25 mm. long, much longer than the bracts and the calyx. W.
G. bicolor Pip.
- HH. Plant 5—30 cm. high; corolla-tube 8—12 mm. long, but little longer than the bracts and the calyx. U.
G. ciliata Benth.
- FF. Flowers not in a head-like cluster; corolla funnel-form to rotate.
- I. Corolla almost rotate, 8—10 mm. wide. E.
G. pharnaceoides Benth.
- II. Corolla tubular-funnel-form, 3—12 mm. long.
- J. Ovules 1 in each cell; corolla 2—4 mm. long; calyx-lobes as long as the calyx-tube or longer. C. E.
G. harknesii Cur.
- JJ. Ovules 3—5 in each cell; corolla 4—6 mm. long; calyx-lobes about equaling the calyx-tube. E.
G. filipes Benth.
- JJJ. Ovules 2—5 in each cell; corolla about 12 mm. long; calyx-lobes shorter than calyx-tube. E.
G. bolanderi Gray
- BB. Leaves alternate, or sometimes a few of the lower ones opposite.
- K. Herbage woolly; flowers pale blue, clustered.
- L. Biennial; flowers many in the head-like clusters. E.
G. congesta Hook.
- LL. Annual; flowers few in the clusters.
- M. Most of the leaves 3-parted; ovules 4—6 in each cell. E.
G. filifolia Nutt.
- MM. Most of the leaves entire; ovules 1—4 in each cell. E. (*Hugelia floccosa*.) *G. floccosa* Gray
- KK. Herbage not woolly.
- N. Leaves entire or some of the lower ones 3-parted.
- O. Flowers 10—20 mm. long, pink or red. C. E. (*G. filiformis* for our region.) *G. capillaris* Kell.
- OO. Flowers 5—10 mm. long, pink or purple.
- P. Stem simple below; flowers 8—10 mm. long. W. C. E. (*G. micrantha*.) *G. gracilis* Hook.

- PP. Stem branched from base; flowers 5—7 mm. long. C. E. (*G. humilis glabella*.)
G. humilis Pip.
- OOO. Flowers 2—4 mm. long, various in color.
- Q. Upper leaves merely minute subulate bracts; lower leaves often 3-parted; stem 25—50 cm. high. E. (*G. tweedyi*.)
G. minutiflora Benth.
- QQ. Upper leaves linear; lower leaves not parted; stem 10—30 cm. high. U. E. (*G. linearifolia*.)
G. tenerrima Gray
- NN. Leaves pinnately-parted or -dissected or -lobed, sometimes a few at the top entire.
- R. Leaves mostly in a basal rosette.
- S. Basal leaves dentate, not pubescent. E.
G. leptomeria Gray
- SS. Basal leaves pinnatifid, pubescent. E. (*G. inconspicua sinuata*.)
G. inconspicua Dougl.
- RR. Leaves not in a basal rosette.
- T. Flowers not grouped into an inflorescence, solitary on long peduncles in the leaf-axils. E.
G. micromeria Gray
- TT. Flowers in panicles or corymbs or heads or clusters.
- U. Flowers in elongated panicles; biennial; corolla-tube 2—2.5 cm. long. E. *G. aggregata* Spreng. (Scarlet Gilia)
- UU. Flowers in heads; annual or biennial; corolla-tube shorter.
- V. Calyx woolly; corolla 10—12 mm. long. W.
G. achillaeifolia Benth.
- VV. Calyx not woolly; glabrous; corolla 8—10 mm. long. W. E.
G. capitata Hook.

NAVARRETIA

NAVARRETIA

Herbs, annual, low. Leaves alternate; 1—2-pinnatifid or some entire. Flowers small, in head-like clusters; clusters leaf-bracted. Calyx-tube with five prominent great angles or veins, scarious between the angles; lobes unequal, erect or spreading, hard-tipped, entire or the larger ones spinulose-toothed or -cleft. Corolla tubular-funnelform to salverform; lobes rather small, oval or oblong. Stamens inserted in or below the corolla-throat. Seeds mostly mucilaginous, showing spiral threads when wet. (Honor of Navarrete, a Spanish physician.)

- A. Leaves 1-pinnatifid or -incised, or many leaves entire.
- B. Stem not viscid, slender, 2.5—15 cm. high; leaves all slender and filiform except the bracts of the head. E.
N. divaricata Gr.
- BB. Stem very viscid, stout, rigid, 15—18 cm. high; leaves of the stem mostly laciniate-pinnatifid. U. *N. atractyloides* H. & A.
- AA. Some of the leaves and bracts more than 1-pinnatifid or -incised.
- C. Plant with skunk-like odor, glandular-viscid. W.
H. squarrosa H. & A. (Skunk-weed)
- CC. Plant without skunk-like odor, not glandular nor viscid (except *N. breweri*).
- D. Corolla yellow; plant somewhat glandular-viscid. U. E.
N. breweri Gr.

- DD. Corolla white or blue; plant not glandular-viscid.
- E. Corolla pale blue; leaf-divisions all spinose. U.
N. stricta How.
- EE. Corolla white.
- F. Stem glabrous or glabrate except at the very top; ovules 1—3 in each cell.
- G. Plant 2.5—7.5 cm. high; bracts of the head with spinose lobes. C.
(N. suksdorfii.)
N. minima Gray
- GG. Plant 10—25 cm. high; bracts of the head with barely sharp-pointed lobes. U.
N. leucocephala Benth.
- FF. Stem puberulent or pubescent.
- H. Ovules 3—4 in each cell; stem pubescent; calyx-tube and base of bracts very hairy. E.
N. intertexta Hook.
- HH. Ovule 1 in each cell; stem puberulent; calyx-tube and bracts sparsely hairy. E. N. klickitatensis Suks.

COLLOMIA

COLLOMIA

Herbs. Leaves alternate, entire to dissected, pinnately or palmately veined. Flowers white or yellow or purple, in head-like clusters or in cymes or solitary in the axils and scattered. Calyx obpyramidal, scarious in the sinuses, not distended nor ruptured by the maturing capsules; lobes erect, entire; sinuses often enlarged and with revolute lobes. Corolla tubular-funnelform or salverform. Stamens unequally inserted in the corolla-tube. Seeds both mucilaginous and with spiral threads when wet. (Gk. kolla=glue; referring to the glutinous seeds when wet.)

- A. Leaves or at least the lower ones more or less dissected.
- B. Calyx-lobes triangular- to ovate-lanceolate.
- C. Leaves pinnately veined; annual. W. C.
C. heterophylla Hook.
- CC. Leaves palmately veined; perennial. C.
C. debilis Gr.
- BB. Calyx-lobes subulate; perennial.
- D. Stems loosely branching, often more than one from the same root; inflorescence loose. U. C. glutinosa Benth.
- DD. Stems usually simple but mostly several from the same root; inflorescence dense, head-like. C. C. mazama Cov.
- AA. Leaves entire or at most merely serrate.
- E. Flowers solitary in the axils. E.
C. tenella Gray
- EE. Flowers in clusters.
- F. Corolla pink, 1 cm. long.
- G. Calyx-lobes aristate; flowers few in a cluster. C. E. (C. tinctoria.)
C. aristella Rydb.
- GG. Calyx-lobes acute; flowers many in a cluster. E. (C. linearis subulata.)
C. linearis Nutt.
- FF. Corolla salmon-colored, 2—3 cm. long. W. C. E. (C. grandiflora diffusa; C. grandiflora axillaris.)
C. grandiflora Dougl.

POLEMONIUM

GREEK VALERIAN

Herbs. Leaves alternate, pinnately-parted or -compound. Flowers mostly showy, in cymes or panicles or racemes or thyrses. Calyx herbaceous thruout, not angled, not ribbed, loose about the capsule, campanulate or narrower, cleft to the middle; lobes equal, erect to spreading. Corolla regular, funnelform to rotate. Seeds mucilaginous when wet. (Gk. polemos=war; it is said that two kings fought over the honor of the discovery of its medicinal uses.)

A. Corolla yellow, 16—20 mm. long, its lobes 3—4 times as long as its tube; plant 1.5—4.5 dm. high. C. *P. luteum* How.

AA. Corolla white or cream-colored or blue or salmon-colored, various in length and in lobing.

B. Leaflets 2—3-divided and thus appearing in fascicles or whorls, 2—6 mm. long. C. E. *P. confertum* Gray

BB. Leaflets entire, not as if fascicled, usually longer.

C. Leaflets 2—12 mm. long; stem 5—30 cm. high.

D. Corolla white, nearly rotate; our only annual species. E. *P. micranthum* Benth.

DD. Corolla blue, campanulate; perennial.

E. Flower violet with a yellow eye. C. E. *P. elegans* Gr.

EE. Flower pale blue or purplish or white, without eye.

F. Plants densely caespitose, 5—10 cm. high; leaflets 30—40. C. (*P. viscosum pilosum*.) *P. viscosum* Nutt.

FF. Plants loosely caespitose, 15—30 cm. high; leaflets 9—21. W. C. E. (*P. pulchellum*.)

P. humile R. & S.

CC. Leaflets 12—35 mm. or more long; stems often over 30 cm. high.

G. Corolla salmon- or flesh-colored, 25—37 cm. wide. U. *P. carneum* Gray

GG. Corolla white or cream-colored or blue, less than 25 cm. wide.

H. Stems 6—9 dm. high; seeds 6—13 in each cell.

I. Leaflets oblong-ovate. C. E. (*P. coeruleum* for our region; *P. foliosissimum*.) *P. occidentale* Gray

II. Leaflets linear. E.

P. pectinatum Gr.

HH. Stems 1.5—5 dm. high; seeds 3—4 in each cell. W.

P. amoenum Pip.

HYDROPHYLLACEAE Water-leaf Family

Herbs or rarely shrubs, often rough-hairy. Leaves alternate or opposite; stipules none. Flowers in scorpioid bractless cymes or spikes or racemes, or solitary on basal peduncles. Calyx 5-parted or of 5 nearly distinct sepals. Corolla regular, 5-lobed, rotate or campanulate or funnelform or salverform. Stamens 5, alternate with the corolla-lobes, on base of corolla. Ovary superior; styles 1—2, often 2-lobed or -cleft when only 1; ovules 4—many. Fruit a capsule, 1—2-celled, 2—4-valved. Seeds 2 to many.

A. Herbs, not evergreen; leaves without balsamic resin.

B. Stems elongated, leafy; flowers either not solitary or else not on basal peduncles.

C. Flowers grouped in bractless inflorescences; stems and leaves often unlike those in CC.

- D. Style 2-lobed or cleft at apex; leaves rarely reniform; stems leafy.
 E. Corolla convolute in the bud; placentae wide.
 F. Annual; stamens included; ovules 4—20. NEMOPHILA (p. 319)
 FF. Perennial; stamens exserted; ovules 4. HYDROPHYLLUM (p. 320)
 EE. Corolla imbricate in the bud; placentae narrow.
 G. Corolla deciduous, rarely yellowish and then the stamens exserted;
 stamens unequally inserted in the corolla. PHACELIA (p. 317)
 GG. Corolla persistent, yellow or yellowish; stamens included, equally
 inserted at the very base of the corolla. EMMENANTHE (p. 317)
 DD. Style and even the stigma entire; leaves round-reniform; 25 mm. or less
 wide; stems almost leafless. ROMANZOFFIA (p. 321)
 CC. Flowers solitary in the leaf-axils; stems 5—10 cm. long, dichotomously
 branched; leaves entire, linear-spatulate, 1—3 cm. long.
 H. Styles 2, distinct to the ovary. NAMA (p. 321)
 HH. Style 1, 2-cleft at the apex. CONANTHUS (p. 321)
 BB. Acaulescent; leaves all basal; flowers solitary on basal peduncles.
 CAPNOREA (p. 320)
 AA. Shrubs, evergreen, glabrous, 9—15 dm. high; leaves glutinous with a balsamic
 resin, lanceolate, entire or serrate, 7.5—15 cm. long. ERIODICTYON (p. 321)

EMMENANTHE

WHISPERING BELLS

Herbs, low, annual. Leaves alternate, entire or pinnatifid. Flowers yellow or yellowish, in simple or circinate racemes. Calyx 5-parted; sinuses without appendages. Corolla campanulate, 5-cleft, with or without appendages within, persistent. Stamens included, on the very base of the corolla; filaments slender. Ovary ovoid or oblong, compressed, 2-celled; ovules many; style 2-lobed; stigmas slightly capitate. Capsule ovoid or oblong, incompletely 2-celled. Seeds 2—20 (8—20 in ours), reticulate or pitted or transversely rugose. (Gk. *emmenos*=a month, *anthos*=a flower; said to be because the corolla is persistent.)

- A. Leaves entire or nearly so; corolla nearly white, without appendages inside. E.
E. pusilla Gray
 AA. Leaves deeply lobed or pinnatifid; corolla bright yellow, with 10 appendages
 inside.
 B. Style much longer than the ovary; ovules about 11; seeds 8—10; calyx-lobes
 linear. E. *E. lutea* Gray
 BB. Style hardly longer than the ovary; ovules 20—40; seeds 15—20; calyx-
 lobes linear-spatulate. E. *E. parviflora* Gray

PHACELIA

PHACELIA

Herbs, annual or biennial or perennial. Leaves alternate, pinnately or palmately veined, simple, or compound when pinnately veined. Flowers in somewhat scorpioid clusters, blue or purple or white or yellowish. Calyx-lobes deciduous or at least thrown off by the enlarging capsule (except in *P. sericea*). Corolla-tube rotate to tubular; often with 10 vertical folds in pairs at base of stamens. Stamens unequally inserted in the corolla-tube. Placentae 2, parietal; style 2-cleft or -parted. Capsule 1-celled or nearly 2-celled. Seeds 2 to many. (Gk. *fakelos*=a fascicle; referring to the flower-bunches.)

- A. Leaves simple and entire, or the lower more or less pinnate with entire and much smaller lateral divisions.
 B. Ovules 4; seeds 4 or fewer.

- C. Leaves all opposite except the uppermost; branches all opposite; inflorescence hardly scorpioid. U. C. *P. pringlei* Gray
- CC. Leaves all alternate except sometimes a few at the base; branches alternate; inflorescence scorpioid.
- D. Plant 6—18 dm. high; flowers greenish-yellow. W. C.
P. nemoralis Gr.
- DD. Plant 1.5—6 dm. high; flowers various.
- E. Calyx-segments oblanceolate, hispid with spreading hairs; leaves somewhat villous-pubescent. E.
P. mutabilis Gr.
- EE. Calyx-segments linear to oblong, hispid or not; leaves often pubescent but not villous.
- F. Corolla deep indigo-blue; leaf-blade widest above its middle. E.
P. humilis T. & G.
- FF. Corolla white or yellowish or light-blue; leaf-blade widest at or below its middle.
- G. Less than half the leaves simple; plant annual or biennial; corolla white or yellowish. U.
P. virgata Gr.
- GG. All the leaves simple or only a few of the lower pinnate; plant perennial; corolla white or bluish.
- H. Filaments somewhat bearded; stems mostly single, erect; plant finely canescent and also hispid. E. (*P. burkei*)
P. leucophylla Torr.
- HH. Filaments glabrous; stems clustered, somewhat leaning; plant densely silky-pubescent, not hispid. E.
P. heterophylla Pursh
- BB. Ovules and seeds 8—12 or more.
- I. Plant soft-hairy; leaf-blades widest above their middle; corolla little exceeding the calyx. U. *P. verna* How.
- II. Plant stiff-hairy; leaf-blades of simple leaves widest at or below their middle; corolla about twice as long as the calyx.
- J. Annual; appendages inside the corolla long and narrow; ovules 12—16; seeds 16 or fewer. W. C. E. (*P. menziesii*)
P. linearis Holz.
- JJ. Perennial; appendages inside the corolla semi-obovate; ovules 40—50; seeds more than 16. U.
P. bolanderi Gray
- AA. Leaves crenate to segmented or compound, the lobes somewhat equal and often not entire.
- K. Ovules only 4; seeds 4 or fewer.
- L. Leaves all simple, often lobed or crenate, truncate or cordate at base, oval to rounded, all the basal ones somewhat palmately veined.
- M. Leaves round-cordate, all palmately veined at their bases; corolla 6—8 mm. long; stamens exserted. U.
P. malvaefolia Cham.
- MM. Leaves oval to ovate-oblong, only the lower ones palmately veined at their bases, truncate to subcordate at base; corolla 4 mm. long; stamens included. U. C. *P. rattani* Gray
- LL. At least the basal leaves pinnately compound, obtuse or narrower at base, when simple, pinnately veined when simple.

- N. Leaflets or leaf-segments entire. U.
 P. virgata Gr.
- NN. Leaflets or leaf-segments incised or pinnatifid.
 O. Perennial; 3—9 dm. high; calyx-lobes widest above their middle; filaments exserted. E. *P. ramosissima* Dougl.
- OO. Annual; 1—3 dm. high; calyx-lobes widest below their middle; filaments included. E. *P. ciliata* Benth.
- KK. Ovules and seeds 8 or more.
 P. Ovules 40 or more; seeds 30 or more; plant villous-pubescent. E.
 P. franklinii Gray
- PP. Ovules and seeds 8—24; plant often pubescent but not villous (except sometimes *P. idahoensis*).
- Q. Stamens and style exserted.
 R. Leaves silky; inflorescence not glandular. W. C. E.
 P. sericea Gray
- RR. Leaves green; inflorescence often glandular.
 S. Plants 9—21 dm. high; corolla ochroleucous. C. E.
 P. procera Gray
- SS. Plants 1—6 dm. high; corolla white or blue.
 T. Calyx-lobes ciliate; leaves not glandular. E.
 P. idahoensis Hend.
- TT. Calyx-lobes not ciliate; leaves glandular. E.
 P. lenta Pip.
- QQ. Stamens and style included.
 U. Corolla hardly longer than the calyx.
- V. Calyx-lobes glandular.
 W. Leaves 1-pinnate and then lobed; corolla pale violet. E.
 P. glandulifera Pip.
- WW. Leaves 2-pinnate; corolla purple. E.
 P. luteopurpurea Nels.
- VV. Calyx-lobes glandless. E.
 P. ivesiana Torr.
- UU. Corolla about twice as long as the calyx, 12—16 mm. long; calyx-lobes 6—8 mm. long. E.
 P. bicolor Torr.

NEMOPHILA

GROVE-LOVER

Herbs, annual. Leaves opposite or alternate, usually pinnatifid. Flowers usually large, on rather long peduncles. Calyx with a reflexed or spreading appendage in each sinus, enlarged in fruit. Corolla rotate to tubular, usually longer than the calyx, usually with 10 appendages within. Stamens shorter than the corolla. Ovules 4—20. (Gk. *nemos*=a groove, *phileo*=I love; from the shady habitat.)

A. Corolla rotate, white or light blue, speckled with dark blue; leaves opposite. W.
 (*N. johnsoni*.) *N. menziesii* H. & A.

AA. Corolla campanulate to tubular, white or bluish, not speckled; leaves opposite or alternate.

B. Leaves mostly opposite; corolla equaling the calyx, white or bluish.

C. Corolla bluish, twice as long as the calyx; calyx-lobes subulate. W. C. (*N. densa*.) *N. sepulta* Par.

CC. Corolla white, less than twice as long as the calyx; calyx-lobes lanceolate or wider.

- D. Leaves oblong; seeds mostly 6—8. E.
 N. pedunculata Dougl.
 DD. Leaves ovate; seeds mostly 4. W. C. E. (*N. hirtleyi*; *N. postulata*).
 N. parviflora Dougl.
 BB. Leaves mostly alternate; corolla shorter than the calyx, white. E. (*N. inconspicua*).
 N. breviflora Gray

HYDROPHYLLUM

WATER-LEAF

Herbs, perennial. Leaves alternate, petioled, pinnately-lobed or -divided. Flowers small, on long naked peduncles, in terminal scorpioid racemes or cymes or heads. Calyx without appendages at the sinuses, nearly unchanged in fruit. Corolla campanulate, with appendages inside; appendages linear, longitudinal, one opposite each corolla-lobe, forming a nectar-groove with its infolded edges. Filaments long-exserted, bearded at the middle. Ovules 4; style long-exserted. Seeds 1—4. (Gk. hydor=water, phyllon=leaf; it was supposed that each leaf had a water-cavity.)

- A. Flowers in a dense head; peduncle shorter than the petiole; leaf-lobes obtuse. E.
 N. parviflora Dougl.
 AA. Flowers in a loose head or a cyme; peduncle longer than the petiole.
 B. Basal leaves 3—5-parted; calyx-lobes glabrous on the back, ciliate with stiff hairs; leaf-lobes mostly acute. W. (*H. virginicum* for our region.)
 H. tenuipes Hel.
 BB. Basal leaves 5—15-parted; calyx-lobes pubescent on the back, ciliate with long soft hairs.
 C. Leaf-lobes obtuse. U. C. *H. occidentale* Gray
 CC. Leaf-lobes acute.
 D. Plant 4—6 cm. high. C. E.
 H. albifrons Hel.
 DD. Plant 20—40 cm. high. E.
 H. fendleri Hel.

CAPNOREA (*Hesperochiron*)

Herbs, perennial, low, acaulescent. Leaves entire, spatulate or oblong; petioles mostly elongated, margined. Peduncles naked, 1-flowered, axillary, equaling or shorter than the leaves. Calyx 5-parted, rarely 6—7-parted; segments linear-lanceolate, sometimes unequal. Corolla campanulate or rotate or saucer-shaped, deciduous. Stamens on base of corolla-tube. Ovary 1-celled; placentae 2, narrow, projecting into the ovary somewhat. Style 2-cleft. Capsule loculicidal. Seeds 15—20, large. (Gk. kapnos=smoke; apparently from the smoke-colored leaves.)

- A. Corolla saucer-shaped.
 B. Leaves pubescent beneath.
 C. Pubescence appressed. E.
 C. villosula Gr.
 CC. Pubescence not appressed. E.
 C. hirtella Gr.
 BB. Leaves glabrous except on the margin.
 D. Calyx-lobes very unequal. E.
 C. fulcrata Gr.
 DD. Calyx-lobes almost equal. E.
 C. pumila Gr.
 AA. Corolla campanulate. E. (Probably *C. lasiantha*).
 C. nana Raf.

CONANTHUS

Herbs, low, annual, rough-hairy. Leaves alternate, entire. Flowers solitary, in the forks of leafy branches. Calyx-sinuses without appendages; segments not enlarged in fruit. Corolla tubular-funnelform, without appendages inside. Stamens included, unequal and unequally inserted about the middle of the corolla-tube. Ovary 1-celled or nearly 2-celled; style 2-lobed. Capsule rounded-ovate. Seeds 10—20, smooth. (Gk. konos=a cone, anthos=a flower; probably referring to the form of the corolla.)

A. Corolla 5 mm. or less long. E. (*Gilia hispida*.)

C. *parviflora* Greenm.

AA. Corolla 6 mm. or more long. E.

C. *aretioides* Wats.

ROMANZOFFIA

Herbs, perennial, 1—2.5 dm. high (ours). Leaves alternate, chiefly basal, round or reniform or cordate, crenately lobed; petioles long, leaves in ours 3—7-lobed, 2.5—10 cm. long. Flowers showy, loosely racemose or somewhat paniculate, on scape-like stems, white (ours). Corolla funnelform (ours) or almost campanulate, 12—17 mm. long (ours). Stamens on base of the corolla-tube, unequal. Ovary 2-celled or nearly so; placentae narrowly linear; style 1; stigma entire. Capsule long, retuse. Seeds many. (Honor of N. Romanzoff, a Russian nobleman who sent Kotzebue to Alaska.) W. C.

R. *sitchensis* Bong.

NAMA (Hydrolea)

Herbs (ours) or somewhat shrubby at base, low; ours annual, diffuse or depressed, 5—10 cm. long, dichotomously branched. Leaves alternate; in ours entire, linear-spatulate, 12—30 mm. long. Flowers terminal or lateral or in the stem-forks (ours). Calyx-segments in ours linear or setaceous, 8 mm. long. Corolla funnelform or somewhat salverform, purple (ours), about 12 mm. long (ours). Filaments included, somewhat unequally inserted, unequal. Ovary nearly or quite 2-celled. Capsule loculicidal, short-oblong (ours). Seeds 10—16 (ours). (Gk. nama=a stream; probably referring to the habitat.) E.

N. *demissum* Gray

ERIODICTYON

Shrubs; ours glabrous, glutinous with a balsamic resin, erect, 9—15 dm. high. Leaves alternate, pinnately veined, finely reticulate; in ours lanceolate, 7.5—15 cm. long, entire or serrate, evergreen, green and glabrous above, whitish and short-hairy beneath. Flowers white or violet or purple (ours), in scorpioid cymes. Sepals narrow, subulate (ours), not enlarging upward, 4 mm. long (ours). Corolla tubular-funnelform (ours) or campanulate, 12 mm. long (ours). Filaments included. Ovary nearly or quite 2-celled. Capsule small, 4-valved, loculicidal and septicidal. Seeds few. (Gk. erion=wool, diktyon=a net; from the hairy and reticulate-veiny under side of the leaves.) E.

E. *glutinosum* Benth. (Yerba Santa)

BORAGINACEAE

Borage Family

Herbs (ours) or shrubs or trees, annual or perennial. Leaves alternate, rarely opposite or whorled, mostly entire, hairy; stipules none. Flowers perfect, usually regular, mostly blue, mostly in 1-sided scorpioid spikes or racemes or cymes, rarely scattered. Calyx mostly 5-lobed or -cleft or -parted, usually persistent. Corolla sympetalous, mostly regu-

lar, 5-lobed, sometimes with appendages in the throat. Stamens as many as the corolla-lobes and alternate with them, on the tube or throat of the corolla. Disk usually conspicuous. Ovary superior, usually of 2 or 4 somewhat globose lobes with a common style from between them, but sometimes of 1 unlobed ovary with terminal style; ovules 4; style entire to 2-parted. Fruit of two 2-seeded carpels or of four 1-seeded nutlets.

- A. Ovary undivided, sometimes 2—4-grooved; style at tip of ovary.
 - B. Plant hairy, prostrate, annual; leaves ovate to rounded, 4—8 mm. long; style 2 cleft or -parted. COLDENIA (p. 323)
 - BB. Plant glabrous, spreading, perennial; leaves obovate to linear, 25—50 mm. long; style entire or none. HELIOTROPIUM (p. 323)
- AA. Ovary 4-cleft or -divided; style arising from between the parts of the ovary.
 - C. Prickles of the nutlets barbed.
 - D. Nutlets spreading, prickly all over; flowers blue. CYNOGLOSSUM (p. 323)
 - DD. Nutlets erect, prickly on the margin and sometimes on the back; flowers variously colored. LAPPULA (p. 324)
 - CC. Prickles of the nutlets hooked; flowers white. PECTOCARYA (p. 323)
 - CCC. Prickles of the nutlets neither barbed nor hooked, or none at all.
 - E. Nutlets attached laterally to a pyramid-like projection of the receptacle.
 - F. Calyx with 5 wide flat lobes and 5 smaller ones alternating with them; corolla blue. ASPERUGO (p. 329)
 - FF. Calyx simply 5-lobed, without the 5 smaller alternating ones.
 - G. Lower leaves opposite. ALLOCARYA (p. 325)
 - GG. Leaves all alternate.
 - H. Flowers yellow.
 - I. Annual; scar of nutlets ovate or oblong; throat of corolla naked or merely with hairy tufts within. AMSINCKIA (p. 328)
 - II. Biennial or perennial; scar of nutlets very slender; throat of the corolla with prominent folds within. OREOCARYA (p. 327)
 - HH. Flowers white.
 - J. Stems repeatedly dichotomously branched; annual.
 - K. Sepals distinct to the base; ventral groove of the nutlets not forked at base; most of the leaves in a basal tuft. EREMOCARYA (p. 326)
 - KK. Sepals distinct to the middle; ventral groove of the nutlets forked at base; leaves scattered, not mostly basal. PIPTOCALYX (p. 326)
 - JJ. Stems not dichotomously branched; annual or perennial.
 - L. Annual; pedicels persistent; leaves mostly in a basal tuft; nutlets keeled on both sides. PLAGIOBOTHRYX (p. 326)
 - LL. Biennial or perennial; pedicels persistent; leaves scattered along the stem; nutlets not keeled. OREOCARYA (p. 327)
 - LLL. Annual; pedicels deciduous (except in *C. pterocarya*); leaves scattered along the stem; nutlets not keeled (except some in *C. pterocarya*.) CRYPTANTHE (p. 327)
 - HHH. Flowers blue or purple or pink.
 - M. Nutlets erect; corolla tubular-funnelform; plant not conspicuously white-hairy nor silvery-hairy. MERTENSIA (p. 329)
 - MM. Nutlets ascending to horizontal; corolla rotate or salverform; plant conspicuously silvery- or white-hairy. ERITICHIMUM (p. 325)
- EE. Nutlets attached by the very base.

N. Raceme bractless; roots slender; flowers white or blue; corolla-lobes convolute in the bud. MYOSOTIS (p. 329)

NN. Raceme bracted; roots thick; flowers white or yellow; corolla-lobes imbricate in the bud. LITHOSPERMUM (p. 330)

COLDENIA

Annual (ours), low, herbaceous (ours) or slightly woody, prostrate (ours), hairy (ours). Leaves entire; in ours ovate to rounded-rhomboid, 4—8 mm. long, margin somewhat revolute. Flowers many, small, white or pink, sessile, usually in cluster (so ours). Calyx equaling the corolla-tube (ours). Corolla short-funnelform, rarely much exceeding the calyx; tube with 5 scales inside near base. Stamens included. Ovary entire, with 4 grooves (ours), 4-celled; style 2-cleft or -parted. Fruit separating at maturity into four 1-seeded nutlets. (Honor of C. Colden, a colonial Lieutenant-Governor of N. Y.) E.
C. nuttallii Hook.

HELIOTROPIUM

HELIOTROPE

Annual (ours) or perennial. Leaves in ours entire, ovate to linear, 2.5—5 cm. long, 3—6 mm. wide, obtuse, mostly narrowed to petioles. Flowers small (about 4 mm. wide), white or blue, in scorpioid spikes (ours) or scattered. Calyx-segments lanceolate (ours) or linear. Corolla salverform or funnelform; throat naked; tube cylindric. Stamens included; filaments short or none. Fruit 2- or 4-lobed (ours), separating into two 2-seeded carpels or into four 1-seeded nutlets (ours). On saline soil. (Gk. helios=the sun; trope=a turn; referring to its flowering at the summer solstice.) E.

H. curassavicum L. (Sea-side Heliotrope)

PECTOCARYA

Annual. Leaves imperfectly opposite. Flowers small, scattered along the whole length of the stem. Calyx spreading or reflexed in fruit. Corolla-throat almost closed by the appendages. Stamens included. Nutlets flat, thin, attached beneath at the inner edge; margin winged, or laciniately bordered or pinnately prickly; prickles bent into a hook at tip. (Gk. pekto=comb-like, karyon=a nut; from the comb-like margin of the nutlets of some.)

A. Bristles of the calyx-lobes small, the tip curved into a hook; herbage strigose-pubescent; wing of the nutlets none. E.

P. pusilla Gray

AA. Bristles of the calyx-lobes stout, straight; herbage hispid; wing of the nutlets scarious, bristly. E. P. setosa Gray

AAA. Bristles of the calyx-lobes small, straight; herbage strigose pubescent; wing of the nutlets not scarious, undulate or fiddle-shaped, not bristly. E.

P. penicillata DC.

CYNOGLOSSUM

HOUND'S TONGUE

Coarse, hairy, perennial (ours). Leaves wide. Flowers rather small, in panicked and mostly bractless racemes. Calyx persistent, open in fruit. Corolla short-salverform or funnelform, with conspicuous arching crests at the throat. Stamens included. Style included. Nutlets of the fruit 4, oblique, flat or convex above, wingless, covered on back or all over with short stout barbed prickles. (Gk. kyan=a dog, glossa=the tongue; from a resemblance in the leaf.)

- A. Lower leaves ovate to subcordate; upper leaves wing-petioled; calyx segments ovate; corolla-tube hardly exceeding its lobes. W. C.

C. grande Dougl.

- AA. Lower leaves spatulate; upper leaves sessile or partly clasping; calyx segments lanceolate; corolla-tube 2—3 times as long as its lobes. U. C.

C. occidentale Gray

LAPPULA (*Echinosperrum*)

STICK-SEED

Annual or perennial, often stiff-hairy, erect, branching. Leaves mostly narrow, entire. Flowers small or minute, white or blue or yellowish or pink (not ours), in terminal bracted or bractless racemes or cymes. Calyx-segments narrow. Corolla salverform or funnellform; tube very short; throat closed by scale-like appendages. Stamens included. Style short. Nutlets 4, erect or incurved, laterally attached to the receptacle, at length separating, margins and often the back with prickles; prickles barbed, stout, often flattened, distinct or united at base to form a wing. (Diminutive of *L. lappa*=a bur; referring to the fruit.)

- A. Flowers blue.

- B. Upper part of the raceme bractless.

- C. Flowers 4—6 mm. wide. E.

L. floribunda Gr.

- CC. Flowers 8—10 mm. wide. C. E.

L. diffusa Gr.

- BB. Raceme with bracts to the top.

- D. Annual; scar of the nutlets linear.

- E. Marginal fruit-prickles in 2 rows, distinct to base. E. (*L. lappula*; *L. myosotis*.)

L. echinata Gili. (European Stick-seed)

- EE. Marginal fruit-prickles in 1 row.

- F. Marginal fruit-prickles distinct to base. E. (*L. fremontii*.)

L. occidentalis Rydb.

- FF. Marginal fruit-prickles united at base. E. (*L. texana*.)

L. cupulata Rydb.

- DD. Perennial; scar of the nutlets triangular or ovate.

- G. Leaves bristly-hairy. U.

L. setosa Pip.

- GG. Leaves soft-hairy.

- H. Hairs of the plant appressed except sometimes on the petiole.

- I. Marginal fruit-prickles free to the base. E.

L. cusickii Pip.

- II. Marginal fruit-prickles united at base. E.

L. ciliata Gr.

- HH. Hairs of the plant not appressed. E.

L. saxatilis Pip.

- AA. Flowers white or greenish or yellowish.

- J. Hairs spreading, not appressed.

- K. Plant soft-hairy below, stiff-hairy above; panicle-branches about 6-flowered; marginal fruit-prickles united at base. E.

L. hispidula Gr.

- KK. Whole plant stiff-hairy; panicle-branches 10—15-flowered; marginal fruit-prickles free to base. C. *L. californica* Pip.

- JJ. Hairs appressed.

- L. Marginal fruit-prickles united at base; corolla appendages hairy.
 M. Plant ashy-gray; basal leaves 6—10 mm. long; calyx-lobes acute; corolla 6—7 mm. wide; inner face of the nutlets smooth. E.
 L. cinerea Pip.
 MM. Plant not so; basal leaves 8—20 cm. long; calyx-lobes obtuse; corolla 10—12 mm. wide; inner face of the nutlets rough or hairy. E. (*L. cottoni*.)
 L. arida Pip.
 LL. Marginal fruit-prickles free to the base.
 N. Corolla-appendages puberulent, wider than long; dorsal fruit-prickles not shorter than the marginal ones. (See KK.)
 NN. Corolla-appendages merely papillate, not wider than long; dorsal fruit-prickles shorter than the marginal ones. E.
 L. hendersoni Pip.

ERITRICHIMUM

Annual or perennial, low, hairy. Leaves 2 cm. or less long, largely basal and petioled. Flowers small, white or blue (ours). Calyx open and but little enlarged in fruit. Corolla-tube short; limb somewhat rotate; appendages almost closing the throat. Stamens included. Ovary 4-lobed. Nutlets obliquely ascending, or depressed and nearly horizontal, with truncate-campanulate back; border acute, winged or at length revolute, entire or dentate or spinulose. (Gk. *erion*=wool; *thrix*=hair; referring to the hairy herbage.)

- A. Basal leaves linear-spatulate; corolla 8—10 mm. wide; nutlets wingless, the sharp edge entire; plant with short silky hairs. C. (*E. elongatum*.)
 E. howardi Rydb.
 AA. Basal leaves lanceolate to ovate; corolla 4—6 mm. wide; nutlets winged, the wing toothed or lobed; plant with long shaggy hairs. C. E. (*E. aretioides*.)
 E. argenteum Wight

ALLOCARYA

Low, mostly annual. Leaves entire, the lowest always opposite. Flowers in scorpioid racemes, rather small; pedicels with top-shaped thickening. Calyx-segments spreading, somewhat enlarged in fruit. Corolla salverform; tube short; throat yellow; limb white. Nutlets ovate to lanceolate, crustaceous, opaque or vitreous-shining, smooth or variously tuberculate and rugose-muriculate or even glochidiate, often carinate on one or both sides, attached to a low gynobase; scar medial to basal or elevated. (Gk. *allos*=another, *karyon*=a nut; that is, another kind of nutlet.)

- A. Corolla 6—10 cm. wide.
 B. Perennial by creeping and rooting stems, abundantly soft-villous. E.
 A. mollis Gr.
 BB. Annual, often appressed-hairy but not villous.
 C. Pedicels 8—17 mm. long; racemes leafy-bracted below. W.
 A. chorisiana Gr.
 CC. Pedicels 2—3 mm. long; racemes bractless or some with small bracts below.
 D. Bristly thruout with spreading or somewhat reflexed hairs. U.
 A. hirta Gr.
 DD. Not bristly, hairs appressed.
 E. Nutlets not stiptate. W. E.
 A. scouleri Gr.

- EE. Nutlets stipitate. W.
 A. stipitata Gr.
 AA. Corolla 2—4 mm. wide; annual.
 F. Nutlets somewhat bristly or prickly. U. E. (Apparently *A. echinoglochis*.)
 A. subglochidiata Pip.
 FF. Nutlets not bristly nor prickly.
 G. Racemes bracted thruout, the lower bracts leafy.
 H. Scar of the nutlets narrowly linear. E.
 A. cusickii Gr.
 HH. Scar of the nutlets ovate. W. (Apparently *A. bracteata*.)
 A. plebia Gr.
 GG. Racemes bractless or bracted only at base.
 I. Nutlets keeled on both sides, with ovate-oblong scar. W.
 A. californica Gr.
 II. Nutlets keeled ventrally but not or hardly so dorsally.
 J. Scar of the nutlets roundish-triangular. E.
 A. hispidula Gr.
 JJ. Scar of the nutlets linear. E.
 A. jucundum Pip.

EREMOCARYA

Annual, small, hirsute-canescens; root containing deep purple stain. Leaves chiefly basal; in ours linear, 4—8 mm. long. Flowers in dense leafy-bracted paired racemes, small, white; pedicels persistent. Calyx-segments veinless, not bristly-hispid. Corolla hardly 2 mm. high (ours). Style enlarged in fruit, persistent. Nutlets neither margined nor carinate, erect, attached by their whole length; gynobase slender, columnar. (Gk. *eremos*=solitary, *karyon*=a nut. Why?) E.

E. micrantha Gr.

PIPTOCALYX

Annual, small, 2.5—10 cm. high (ours), dichotomously branched; root giving a deep purple stain. Leaves in ours linear to spatulate, 6—12 mm. long. Flowers small, white, sessile in the forks of the stems or in the leaf-axils. Calyx hispid (ours), the lower portion persistent as a membranous ring in fruit. Corolla tube not exceeding the calyx; throat naked, open; limb about 2 mm. wide (ours). Stamens included. Nutlets 4, rather distinctly margined, attached by their whole length (ours). (Gk. *piptein*=to fall, +calyx; the upper part of the calyx is deciduous.) E.

P. circumscissus Torr.

PLAGIOBOTHRYX

POP-CORN FLOWER

Annual, mostly soft-pubescent. Leaves largely in a basal tuft. Flowers small, white, in racemes; racemes circinate, often in 2's or 3's. Calyx closed to spreading, somewhat enlarged in fruit, persistent or the upper part deciduous. Corolla short; throat conspicuously appendaged. Nutlets broadly ovate and 3-angled, incurved, keeled on both sides near the apex, the back usually with irregular transverse wrinkles, attached by the middle of the ventral face to a spherical or conical projection, often only 1—2 maturing. (Gk. *plagios*=oblique, *bothros*=a trench; probably referring to the scar on the nutlet.)

A. Plant pubescent to tomentose, not hispid.

- B. Stem simple up to the racemes.
 C. Basal leaves oblanceolate; calyx cleft almost to base. U.
 P. campestre Gr.
 CC. Basal leaves linear to spatulate; calyx cleft to the middle or very little below it. U. (*P. colorans*).
 P. shastensis Gr.
 BB. Stem branching from the base.
 D. Calyx cleft to below the middle, persistent; nutlets somewhat cross-shaped. W.
 E. (*P. asper*.) *P. tenellus* Gray
 DD. Calyx cleft only to the middle, soon deciduous by separating near its base; nutlets ovate.
 E. Plant 1—2.5 cm. high, white-hairy; nutlets 3 mm. long. W. C.
 P. canescens Benth.
 EE. Plant 2.5—5 cm. high, hairy but not white-hairy; nutlets 2 mm. long.
 W. C. *P. nothofulvus* Gray
 AA. Plant hispid.
 F. Nutlets with transverse wrinkles; branches hispid but stem not so. (See D.)
 FF. Nutlets without transverse wrinkles; branches and stem both hispid. E.
 P. hispidus Gray

OREOCARYA

Biennial or perennial, coarse. Flowers mostly white, in head-like or paniced racemes. Calyx somewhat spreading in fruit, not circumsessile, persistent. Corolla with 10 scales or glands at base within; throat with prominent folds within. Nutlets not keeled on the back, 3-angled; lateral angles acute but not winged, attached for the greater part of their length to a base; scar very slender, usually with transversely dilated base. (Gk. *oros*=a mountain, *karyon*=a nut; probably referring to the habitat.)

- A. Corolla tube exceeding the calyx. E.
 C. leucophaea Gr.
 AA. Corolla tube not exceeding the calyx.
 B. Plant thinly stiff-hairy; inflorescence somewhat tawny-hairy; leaves obtuse. E.
 C. sericea Gr.
 BB. Plant densely stiff-hairy; inflorescence not tawny-hairy.
 C. Leaves obtuse; inflorescence very dense. E. (*O. glomerata* for our region.)
 O. celosioides Eastw.
 CC. Leaves acute, inflorescence not very dense. E.
 O. spiculifera Pip.

CRYPTANTHE

NIEVITAS

Annual, slender, hirsute or hispid, branching. Leaves small, narrow, alternate, entire (ours). Flowers in slender spikes or racemes, small, mostly white, sessile or on very short pedicels. Calyx hispid, closely embracing the fruit and usually dropping with it. Corolla small, often inconspicuous, rotate; tube not exceeding the calyx, usually with 5 scales closing the throat. Stamens included. Ovaries 4. Nutlets attached from the upwards to various heights, smooth to papillose, sometimes with slight dorsal ridge, margin sometimes acute or even winged. (Gk. *kryptos*=hidden, *anthos*=a flower; because the corolla is sometimes very small.)

- A. Calyx in fruit closed over the nutlets and falling with them, stiff-hairy; none of the nutlets winged.
 B. Nutlets rough or papillose, ovate, 3-angled, 4, equal.

- C. Sepals 6—10 mm. long, narrowly linear; leaves all linear. E.
C. barbiger Gr.
- CC. Sepals 2—4 mm. long, lanceolate; some of the leaves usually wider than linear.
 D. Calyx twice as long as the nutlets; lower leaves oblong or linear-lanceolate.
 E. (*C. fendleri* for our region.)
C. ambigua Gr.
- DD. Calyx but little longer than the nutlets; lower leaves spatulate. W. C. E.
C. muriculata Gr.
- BB. Nutlets smooth and shining, acute or acuminate, with rounded sides.
- E. Nutlets 1 or rarely 2, long-acuminate.
 F. Ventral groove of the nutlets not forked at base. E. (Apparently *C. multicaule*.)
C. flaccida Gr.
- FF. Ventral groove of the nutlets forked at base.
 G. Plant 5—15 cm. high; leaves 5—15 mm. long; inflorescence 2—8 cm. long; corolla-lobes 1 mm. wide. E.
C. suksdorfii Pip.
- GG. Plant 20—40 cm. high; leaves 10—20 mm. long; inflorescence 5—10 cm. long; corolla-lobes not over 0.7 mm. wide. U.
C. rostellata Gr.
- EE. Nutlets 4, acute or short-acuminate.
- H. Ventral groove of the nutlets not forked at base.
 I. Nutlets attached nearly their whole length to the stalk-like base, their ventral groove not at all widened at base. W.
C. leiocarpa Gr.
- II. Nutlets attached to their middle to the stalk-like base, their ventral groove slightly widened at base. C. E. (Apparently *C. confusa*.)
C. affinis Gr.
- HH. Ventral groove of the nutlets forked at base.
 J. Ventral groove of nutlets not dilated at base into an open scar; sepals lanceolate. E. (*C. torreyana calycosa*; *C. grandiflora*.)
C. torreyana Gr.
- JJ. Ventral groove of nutlets slightly dilated at base into an open scar; sepals linear. E. *C. ramulosissima* Nels.
- AA. Calyx in fruit open, persistent, soft-hairy; 3 or 4 of the nutlets with scarious crenate wings. E.
C. pectocarya Gr.

AMSINCKIA

FIDDLE-NECK

Annual, coarse, hispid. Leaves oblong or ovate to linear. Flowers small, yellow, in racemes or spikes; inflorescence at length loose, without bracts except below. Calyx persistent. Corolla salverform or somewhat funnelform; tube equaling or exceeding the calyx; throat naked or with minute hairy tufts opposite the lobes. Style filiform; stigma 2-lobed. Nutlets ovate-triangular or 3-angled, coriaceous or crustaceous, attached above the middle to an oblong-pyramidal gynobase, the scar ovate or oblong. (Honor of W. Amsinck, a German, who materially aided the Hamburg Botanical Garden.)

A. Nutlets roughened with short hard points, convex or keeled on the back.

B. Calyx-lobes linear; plant erect. W. E.

A. intermedia F. & M.

BB. Calyx-lobes lanceolate or ovate; plant spreading. W. E. (*A. lycopsoides bracteosa*.)
A. lycopsoides Lehm.

AA. Nutlets not roughened with points, the projections rounded and smooth, nearly flat on the back, not keeled. E.

A. *tessellata* Gray

ASPERUGO

MADWORT

Annual, rough-hispid, procumbent. Leaves entire, alternate or the upper sometimes opposite. Flowers small, blue or nearly white, 1—3 together in the upper leaf-axils. Calyx campanulate, unequally 5-cleft, much enlarged and folded together in fruit; the lobes incised. Corolla tubular-campanulate. Stamens included. Style short; stigma capitate. Nutlets of the fruit 4, ovoid, erect, granular-tuberculate, keeled, laterally attached above the middle to the elongated-conic receptacle. (L. *asper*=rough; referring to the leaves.) E.

A. *procumbens* L.

MYOSOTIS

FORGET-ME-NOT

Low, annual or biennial or perennial. Flowers in racemes or spikes, small, blue or pink or white. Corolla salverform or rotate; tube rarely exceeding the calyx; throat with small blunt crests at the base of the lobes. Stamens included. Style filiform, included. Nutlets smooth, somewhat compressed, thinly crustaceous, attached at very base to a flat swelling; scar minute. (Gk. *myos*=of a mouse, *otos*=of an ear; hence mouse-ear-like; referring to the short soft leaves.)

A. Corolla blue; calyx open in fruit; calyx-hairs appressed, none of them hooked nor gland-tipped.

B. Calyx-lobes much shorter than the calyx-tube. W. (*M. palustris*.)

M. *scorpioides* L. (Garden Forget-me-not)

BB. Calyx-lobes as long as the calyx-tube. W. E.

M. *laxa* Lehm. (Blue Forget-me-not)

AA. Corolla white; calyx closing on the fruit; calyx-hairs spreading, some of them minutely hooked or gland-tipped. W. E.

M. *macrosperma* Engelm. (White Forget-me-not)

MERTENSIA

LUNGWORT

Perennial, glabrous or pubescent. Leaves sometimes punctate. Flowers rather large, blue or purple or white, in panicles or cymes or racemes. Calyx lobes linear to triangular, not much enlarged in fruit. Corolla tubular-funnelform or trumpet-shaped, crested or unappendaged in the throat. Stamens included or nearly exerted. Ovary 4-divided; style filiform. Nutlets erect, coriaceous, wrinkled when mature, attached above their bases to the convex or nearly flat receptacle. (Honor of F. K. Mertens, a German botanist.)

A. Plants of the seashore; nutlets fleshy, smooth and shining. W. (*Pneumaria maritima*.)

M. *maritima* S. F. Gray (Sea Lungwort)

AA. Plants not of the seashore; nutlets dry, wrinkled when mature.

B. Plants 5—10 dm. high; leaves thin, wide.

C. Leaves soft-hairy beneath, upper surface various; calyx glabrous or hairy on the back.

D. Upper leaf-surface stiff-hairy.

E. Calyx-lobes canescent. E.

M. *membranacea* Rydb.

EE. Calyx-lobes not canescent.

F. Calyx-lobes pubescent on the back. W. (*M. sibirica* for our region.)

M. *platyphylla* Hel.

- FF. Calyx-lobes glabrous on the back. E.
M. paniculata Don. (Tall Lungwort)
- DD. Upper leaf-surface smooth or merely papillose.
 G. Calyx-lobes pubescent on the back. C. E.
M. subcordata Gr.
- GC. Calyx-lobes glabrous on the back. W. E.
M. leptophylla Pip.
- CC. Leaves glabrous on both sides or merely papillose above; calyx glabrous on the back.
 H. Calyx-lobes either short and obtuse or triangular and acute, not longer than the fruit.
 I. Leaves acute, mostly sessile; calyx-lobes obtuse. C.
M. ambigua Pip.
 II. Leaves acuminate, short-petioled; calyx-lobes acute. E.
M. brachycalyx Pip.
- HH. Calyx-lobes elongate, acute, much longer than the fruit.
 J. Leaves many, pallid, ovate, acuminate. W. C. E.
M. laevigata Pip.
- JJ. Leaves few, green, oblong-lanceolate, obtuse or acutish. E.
M. infirma Pip.
- BB. Plants 1.5—4 dm. high; leaves narrow, thickish.
 K. Basal leaves numerous, their dry bases remaining on the crown of the root; root vertical, not tuberous.
 L. Leaves pubescent on both sides.
M. Plant 1—1.5 dm. high. E.
M. pubescens Pip.
- MM. Plant 3—4.5 dm. high. E.
M. cusickii Pip.
- LL. Leaves glabrous on both sides or merely with some short stiff hairs above. E. (*M. nutans subcalva.*)
M. nutans Pip.
- KK. Basal leaves none; root not a tap-root, tuberous or fasciculate-tuberous.
 N. Leaves glabrous or merely papillose above. E. (*M. pulchella glauca.*)
M. pulchella Pip.
- NN. Leaves stiff-hairy above.
 O. Corolla-tube 1—2 times as long as its limb. E.
M. horneri Pip.
- OO. Corolla-tube 3—4 times as long as its limb. E. (*M. longiflora.*)
M. oblongifolia Don.

LITHOSPERMUM

GROMWELL

Annual or perennial (ours), pubescent or hairy. Leaves sessile. Flowers in leafy-bracted spikes, white or yellow or blue. Calyx-lobes narrow. Corolla salverform or funnellform; throat pubescent or crested. Ovary 4-lobed; style slender; stigma 2-lobed or entire. Nutlets ovate, usually white and smooth, erect, attached at base; gynobase flat, scar flat, rather small. (Gk. lithos—a stone, sperma—a seed.)

A. Sepals 8—16 mm. long; corolla about 20—25 mm. long, bright yellow, lobes much shorter than the throat. U. *L. californicum* Gray

AA. Sepals 6—8 mm. long; corolla 12—16 mm. long, dull greenish-yellow, lobes about equaling the throat. W. E. (*L. pilosum.*)

L. ruderales Dougl. (Woolly Gromwell)

VERBENACEAE

Vervain Family

Ours *perennial herbs*. *Leaves* alternate or *opposite* (ours) or whorled. *Flowers* perfect, irregular to regular, in terminal or axillary spikes (ours) or racemes or cymes or panicles. *Calyx* usually persistent, usually 4—5-lobed or -cleft. *Corolla* sympetalous, regular or 2-lipped; limb 4—5 (ours)-cleft. *Stamens* 2—5, didynamous unless only 2, on the corolla, alternate with the corolla-lobes. *Ovary* superior, 2—4 (ours)-celled, rarely 8—10-celled; *carpels* 2; *ovules* 4; *style* 1, *terminal*; *stigmas* 1—2. *Fruit* in ours dry, *separating into 4 nutlets*.

VERBENA

VERVAIN

Stems 4-angled. *Leaves* pinnately veined, serrate to lobed or pinnatifid. *Flowers* bracted, in ours blue or purple or pink. *Calyx* 5-angled, somewhat unequally 5-toothed. *Corolla* salverform or funnelform; limb slightly 2-lipped or regular. *Stamens* 2 or 4, included. *Style* 2-lobed. *Fruit* mostly enclosed by the calyx; nutlets linear or linear-oblong, crustaceous, smooth or papillose or rugose. (Said to be from Celtic *farfaen* = to remove stone. Why?)

A. Bracts shorter than the calyx.

B. Corolla 8—10 mm. long; plant erect. E.
V. stricta Vent. (Hoary Vervain)

BB. Corolla about 4 mm. long.

C. Plant erect. E. *V. hastata* L. (Blue Vervain)

CC. Plant spreading or ascending. U.
V. prostrata Benth.

AA. Bracts longer than the calyx; plant prostrate or decumbent; corolla about 4 mm. long. E.
V. bracteosa Michx.

MENTHACEAE (Labiatae)

Mint Family

Herbs or shrubs or trees (not ours), erect to vine-like, *stems mostly 4-angled*. *Leaves* simple, *opposite*, *mostly punctate*; stipules none. *Flowers* mostly irregular, perfect, variously clustered but *mostly in axillary whorls*, usually bracted. *Calyx* persistent, regular to 2-lipped, 4—5-lobed, mostly veined. *Corolla*-limb 4—5-lobed, mostly 2-lipped; upper lip entire to 2-lobed; lower lip usually 3-lobed. *Stamens* on the corolla-tube, alternate with the petal-lobes, *usually 4*; 2 usually shorter or antherless or rudimentary or wanting. *Ovary* 4-lobed or -parted, *superior*; *ovules* 4; *style* 1, from the center of the ovary, 2-lobed at the top. *Fruit* of 4 nutlets.

A. Herbs.

B. Plants erect or merely spreading, not vine-like.

C. Corolla distinctly irregular, distinctly 2-lipped in most.

D. Stem villous or densely tomentose.

E. Leaves acute; flowers in terminal spikes on stem and branches; stamens projecting beyond the corolla-tube.

F. Leaves mostly rounded at base; calyx 10-veined; corolla not dark-dotted; ovary 4-lobed. TEUCRIUM (p. 333)

FF. Leaves mostly cordate at base; calyx 15-veined; corolla dark-dotted; ovary 4-parted. NEPETA (p. 334)

EE. Leaves obtuse; flowers in dense axillary clusters; calyx 5—10-veined; corolla not dotted; stamens included in the corolla-tube.

MARRUBIUM (p. 334)

- DD. Stem not villous nor tomentose tho often hairy.
 G. Calyx with a crest or protuberance on one side. SCUTELLARIA (p. 333)
 GG. Calyx without crest or protuberance.
 H. Calyx 15-veined.
 I. Leaves not entire; leaf-blades widest at or below their middle.
 J. Plants not aromatic; flowers in elongated spike-like clusters; all 4 stamens with anthers.
 K. Perennial; leaves triangular-ovate; inflorescence-bracts not pectinate; lower lip of corolla with middle lobe crenulate.
 AGASTACHE (p. 334)
 KK. Annual or biennial; leaves lanceolate; inflorescence-bracts pectinate; lower lip of corolla with middle lobe not crenulate.
 DRACOCEPHALUM (p. 334)
 JJ. Plants aromatic; flowers in flattened or round head-like clusters; 2 stamens with anthers, 2 others from antherless to totally absent.
 MONARDA (p. 336)
 II. Leaves entire, oblanceolate to obovate. POGOGYNE (p. 337)
 HH. Calyx 5—13-veined.
 L. Leaves not cleft.
 M. Flowers in terminal head-like or dense spike-like clusters; calyx 10—13-veined.
 N. Heads elongated, spike-like. PRUNELLA (p. 335)
 NN. Heads flat. MADRONELLA (p. 337)
 MM. Flowers in loose interrupted terminal spike-like clusters; calyx 5—10-veined.
 O. Leaf-teeth sharp-pointed, not rounded; leaves narrowed at base. PHYSOSTEGIA (p. 335)
 OO. Leaf-teeth somewhat rounded at tip; leaves rounded to cordate at base. STACHYS (p. 336)
 MMM. Flowers in whorls in the axils of ordinary stem-leaves; calyx about 5- or 13-veined.
 P. Annual or biennial; upper leaves sessile; flowers purple or red; calyx about 5-veined. LAMIAM (p. 335)
 PP. Perennial; upper leaves petioled; flowers white or yellow; calyx about 13-veined. MELISSA (p. 337)
 LL. Leaves 3-cleft or some 5-cleft; flowers in the axils of ordinary leaves. LEONURUS (p. 335)
 CC. Corolla regular or nearly so.
 Q. Annual; leaves entire or merely slightly wavy; ovary deeply 4-lobed.
 TRICHOSTEMA (p. 333)
 QQ. Perennial; leaves toothed; ovary 4-parted.
 R. Plants without mint odor; 2 stamens with anthers and 2 antherless.
 LYCOPUS (p. 337)
 RR. Plants with mint odor; all 4 stamens with anthers. MENTHA (p. 338)
 BB. Plants prostrate, vine-like.
 S. Plant with disagreeable odor; petioles 25 mm. or more long; leaves dark-green; flowers in small clusters in the leaf-axils. GLECOMA (p. 334)
 SS. Plant with mint odor; petioles 4—6 mm. long; leaves red-green; flowers solitary in the leaf-axils. MICROMERIA (p. 338)
 AA. Shrubs, aromatic; leaves entire, spatulate to obovate. RAMONA (p. 336)

TEUCRIUM

GERMANDER

Herbs (ours) or shrubs; stem villous (ours). Leaves dentate (ours) or entire, mostly rounded at base (ours). Flowers small, white or cream or rose or purple, in terminal bracted spikes (ours) or heads, or in whorls in the upper leaf-axils. Calyx campanulate, 10-veined; equally or unequally 5-toothed. Corolla-tube short; limb irregularly 5-lobed; 2 upper lobes short, oblong; lower lobe largest. Stamens 4, exserted; front pair longer. Nutlets obovoid, rugose-reticulate. (Honor of Teucer, a King of Troy, who first used it medicinally.) E. (*T. occidentale viscidum*.)

T. occidentale Gray

TRICHOSTEMA

BLUE CURLS

Herbs or somewhat shrubby, annual (ours) or perennial, branching. Leaves entire or slightly wavy. Flowers not large, blue (ours), in panicles or cymes; clusters axillary. Calyx campanulate, very unequally to almost equally 5-lobed. Corolla-tube narrow; limb somewhat oblique; lobes somewhat similar, oblong. Stamens 4, long-exserted. (Gk. trichos=hair, stema=stamen; the stamens are long and hair-like.)

A. Calyx-lobes lanceolate, acuminate; corolla-tube not exceeding the calyx. W. E.

T. oblongum Benth.

AA. Calyx-lobes ovate-triangular, acute; corolla-tube exceeding the calyx.

B. Leaves acuminate, obscurely veined; corolla 6—8 mm. long. U.

T. laxum Gray

BB. Leaves acute, strongly veined; corolla about 12 mm. long. W.

T. lanceolatum Benth. (Vinegar-weed)

SCUTELLARIA

SKULL-CAP

Herbs (ours) or shrubs, annual or perennial, bitter. Leaves in ours linear to ovate or obovate, entire or somewhat serrate or dentate. Flowers blue or violet or whitish, in racemes or 1—3 in each leaf-axil; racemes spike-like, axillary or also terminal, bracted, mostly secund. Calyx campanulate, 2-lipped; lips entire; upper lip with appendage on back and often deciduous in fruit; lower lip persistent. Corolla much exserted, dilated above, glabrous inside, 2-lipped; upper lip arched, entire or emarginate; lower lip spreading or deflexed; lateral lobes of lower lip small, middle lobe wide. Stamens 4, all with anthers. (L. scutella=a dish; referring to the appendages of the calyx in fruit.)

A. Leaves or at least the lower ones somewhat serrate or dentate.

B. Leaf-blades widest below their middle.

C. Flowers in axillary and sometimes also terminal racemes; corolla 6—10 mm. long. W. E.

S. lateriflora L. (Mad-dog Skull-cap)

CC. Flowers solitary in the leaf-axils; corolla 14—30 mm. long.

D. Plant .5—1.3 dm. high; leaves obtuse, 6—12 mm. long. U.

S. tuberosa Benth.

DD. Plant 2—9 dm. high; leaves acute, 10—37 mm. long. E.

S. galericulata L. (Marsh Skull-cap)

BB. Leaf-blades widest above their middle; flowers solitary in the leaf-axils. E.

S. nana Gray

AA. Leaves entire.

E. Stem leaves from oblong or lanceolate to obovate, obtuse at both ends; corolla 14—20 mm. long. W. E. (*S. veronicifolia*.)

S. antirrhinoides Benth.

EE. Stem leaves from linear to oblong, acute at base; corolla 16—25 mm. long.

U. E. (*S. siphocampyloides*.)

S. angustifolia Pursh

MARRUBIUM

HOREHOUND

Herbs, perennial, branching, mostly tomentose (ours so). Leaves petioled, dentate, rugose, ovate to orbicular (ours). Flowers small, white or purplish, in dense axillary clusters. Calyx tubular, 5—10-veined, regularly 5—10-toothed; teeth acute or aristate. Corolla-limb 2-lipped; upper lip erect, entire or emarginate; lower lip spreading, 3-cleft, the middle lobe wider. Stamens 4, included, upper pair shorter, anthers 4. Nutlets ovoid, smooth. (Hebrew marrob=a bitter juice.) W. E.

M. vulgare L.

AGASTACHE

GIANT HYSSOP

Herbs, perennial, erect, tall. Leaves serrate, mainly ovate, petioled. Flowers yellowish or purplish or blue, in whorled clusters in spikes; spikes bracted, terminal. Calyx narrowly campanulate, somewhat oblique, slightly 2-lipped, 15-veined, 5-toothed. Corolla strongly 2-lipped; tube as long as the calyx; upper lip erect, 2-lobed; lower lip spreading, 3-lobed, middle lobe wider and crenulate. Stamens 4, lower pair shorter; anthers 4. Nutlets ovoid, smooth. (Gk. agan=much, stachys=a head of wheat; referring to the many spikes.)

A. Leaves canescent and white beneath, glabrous and green above; spikes 25 mm. or less thick. E.

A. urticifolia Rydb.

AA. Leaves glabrous and green on both sides; spikes 25 mm. or more thick. E.

A. occidentalis Hel.

NEPETA

CATNIP

Herbs, erect; ours perennial, pale-green, densely tomentose. Leaves dentate or incised; ours crenate-dentate, mostly cordate at base. Flowers mostly white or blue, small, in whorled clusters; clusters in ours spicate, terminal. Calyx tubular, somewhat oblique at the mouth, 15-veined, scarcely 2-lipped. Corolla dark-dotted (ours), strongly 2-lipped; upper lip erect, entire, emarginate or 2-lobed; lower lip spreading, 3-lobed, the middle lobe larger. Stamens 4, the lower 2 shorter; anthers 4. Nutlets ovoid, compressed, smooth. (Said to be from Nepete, a town in Tuscany, Italy.) W. E.

N. cataria L.

GLECOMA

GROUND IVY

Herbs, perennial (ours), low, creeping, with peculiar odor (ours). Leaves orbicular to reniform, crenate, long-petioled. Flowers rather large, blue or violet, in clusters; clusters axillary, small, whorled. Calyx oblong-tubular, 15-veined, oblique at the throat, not 2-lipped, unequally 5-toothed. Corolla-tube exerted, enlarged above; limb 2-lipped; upper lip erect, 2-lobed or emarginate; lower lip spreading, 3-lobed, middle lobe wide and emarginate, side lobes small. Stamens 4, included, the lower 2 shorter. Nutlets ovoid, smooth. (Greek name for some plant of this family.) W.

G. hederacea L.

DRACOCEPHALUM

DRAGON-HEAD

Herbs, annual or biennial or perennial (not ours). Leaves dentate or incised or entire (not ours). Flowers blue or purple or violet, in clusters; clusters axillary or ter-

minal, bracted; bracts pectinate. Calyx tubular, 15-veined, unequally 5-toothed or 2-lipped. Corolla 2-lipped; upper lip erect, emarginate; lower lip spreading, 3-lobed, middle lobe larger and sometimes 2-cleft. Stamens 4, lower 2 shorter; anthers 4. Nutlets ovoid, smooth. (Gk. drakon=a dragon, kephale=a head; referring to the form of the flower in some species.) C. E.

D. parviflorum Nutt.

PRUNELLA (Brunella)

SELF-HEAL

Herbs, perennial, often green all winter west of the Cascades. Leaves petioled; in ours ovate to oblong-lanceolate, entire or crenate. Flowers purple (ours) or white, in spikes or heads; clusters terminal and sometimes also axillary, dense, bracted. Calyx oblong, about 10-veined, deeply 2-lipped; upper lip truncate to 3-toothed; lower lip 2-cleft, its teeth lanceolate. Corolla-tube slightly narrowed at mouth; limb 2-lipped; upper lip entire, arched; lower lip spreading, 3-lobed. Stamens 4, lower 2 longer; filaments of longer stamens 2-toothed at top, only 1 tooth anther-bearing; anthers 4. Nutlets ovoid, smooth. (German braune=quinsy, for which this was thought a remedy.) W. C. E.

P. vulgaris L.

PHYSOSTEGIA

FALSE DRAGON-HEAD

Herbs, erect, perennial, glabrous or puberulent. Leaves serrate or dentate or entire (not ours), in ours all sessile or the lowest petioled. Flowers pink or white or purple (ours) or violet, bracted, in terminal spikes or spike-like racemes. Calyx campanulate or oblong, membranous, 10-veined, equally 5-toothed. Corolla much exceeding the calyx, strongly 2-lipped; upper lip rounded, entire; lower lip spreading, 3-lobed, middle lobe commonly emarginate. Stamens 4, the lower 2 longer. Nutlets ovoid, 3-angled, smooth. (Gk. physa=a bladder, stegē=a covering; referring to the inflated fruiting calyx.) W. C. E.

P. parviflora Nutt.

LAMIUM

DEAD NETTLE

Herbs, annual or biennial or perennial (not ours), mostly diffuse. Leaves crenate or dentate or entire, mostly cordate, in ours the upper sessile and clasping. Flowers whorled, in axillary and terminal clusters, in ours purplish or red. Calyx campanulate, about 5-veined, 5-toothed. Corolla-tube usually exceeding the calyx (so ours); limb 2-lipped; upper lip concave, erect, usually entire, narrowed at base; lower lip spreading, 3-cleft, middle lobe emarginate, lateral ones sometimes with tooth-like appendage. Stamens 4, lower 2 longer; anthers 4. Nutlets smooth or tuberculate. (Gk. laimos=the throat; because the corolla is widely gaping.) E.

L. amplexicaule L. (Hen-bit)

LEONURUS

MOTHERWORT

Herbs, perennial, tall. Leaves palmately parted to merely dentate. Flowers small, white or pink or purple, in clusters; clusters whorled, dense, axillary. Calyx tubular-campanulate, 5-veined, equally 5-toothed; teeth rigid, subulate or aristate. Corolla 2-lipped; upper lip erect, entire; lower lip spreading or deflexed, 3-lobed, middle lobe wide and obcordate or emarginate. Stamens 4, lower 2 longer. Nutlets 3-sided, smooth. (Gk. leon=a lion, oura=a tail; suggested by the inflorescence.) W.

L. cardiaca L.

STACHYS

HEDGE NETTLE

Herbs, annual or perennial. Leaves in ours lanceolate or wider. Flowers purple (ours) or red or white or yellow, in whorls in spikes; spikes terminal or axillary, dense or interrupted. Calyx 5—10-veined, 5-toothed; teeth nearly equal (ours). Corolla 2-lipped; upper lip erect, concave, entire or emarginate; lower lip 3-cleft, middle lobe wider and sometimes 2-lobed. Stamens 4, lower 2 longer. Nutlets ovoid or oblong. (Gk. *stachys*=a spike or head of wheat; referring to the inflorescence.)

A. Corolla-tube less than $1\frac{1}{2}$ times as long as the calyx.

B. Plant soft-hairy; corolla white or cream-color with some purple on the lower lip. W. E. (*S. vestita*.)

BB. Plant rather stiff-hairy; corolla light red to purple, often purple spotted.

S. pycnantha Benth.

C. Upper leaves sessile, lower short-petioled; leaves acute or acuminate. W. E. (*S. leibergii*.) *S. palustris* L. (Woundwort)

CC. Upper leaves short-petioled, lower long-petioled; leaves obtuse or acute. W. E. *S. bullata* Benth.

AA. Corolla-tube twice as long as the calyx.

D. Leaves tomentose beneath, thick; corolla about 20 mm. long. W. C. *S. chamissonis* Benth.

DD. Leaves not tomentose beneath, thin.

E. Corolla about 20 mm. long; calyx glabrous or sparingly stiff-hairy. W. C. E. *S. ciliata* Dougl.

EE. Corolla about 12 mm. long; calyx soft-hairy. W. (*S. ciliata pubens*; *S. emersoni*.) *S. pubens* Hel.

RAMONA

Herbs or shrubs (ours), perennial, aromatic; in ours bark shreddy, ashy-gray. Leaves in ours 25 mm. or less long, entire, spatulate to obovate, obtuse to retuse. Flowers in head-like to closely paniculate or spike-like clusters. Calyx 2-lipped; lower lip 2-cleft; upper lip 3-toothed or entire; naked inside. Corolla 2-lipped; upper lip spreading, 2-lobed or emarginate; lower lip spreading, 3-lobed, middle lobe wide and emarginate. Stamens 2, exserted, often also 2 rudimentary ones. Nutlets smooth, unchanged when wet. (Possibly from French *ramon*=a broom of twigs; since it is a low much-branched shrub.) E. (*Audibertia incana*.) *R. incana* Dougl.

MONARDA

BERGAMOT MINT

Herbs, annual or perennial (ours), erect, aromatic. Leaves dentate or serrate. Flowers rather large, white or red or purple or yellow or mottled, mostly bracted, in clusters; clusters dense, head-like, terminal or axillary; bracts sometimes colored. Calyx tubular, 15-veined, 5-toothed. Corolla glabrous inside, usually puberulent or glandular outside; 2-lipped; upper lip emarginate or entire; lower lip 3-lobed, middle lobe larger. Anther-bearing stamens 2, usually exserted; antherless stamens or their rudiments 2 or none. Nutlets ovoid, smooth. (Honor of N. Monardes, a Spanish botanist.)

A. Leaves oblong to ovate; stamens longer than the upper lip of the corolla; corolla not spotted, its upper lip straight; heads solitary, terminal. E. (*M. scabra*.)

M. mollis L.

AA. Leaves lanceolate or narrower; stamens shorter than the upper lip of the corolla; corolla purple-spotted, its upper lip curved; heads numerous, terminal and axillary. W.

M. punctata L. (Horse Mint)

MELISSA**GARDEN BALM**

Herbs, perennial (ours), leafy, branching. Leaves wide, dentate; in ours ovate, petioled, 2.5—7 cm. long. Flowers rather small, white or yellowish, in axillary clusters. Calyx oblong-campanulate, 13-veined, 2-lipped; upper lip 3-toothed; lower lip 2-parted. Corolla-tube curved-ascending, larger above, naked inside; limb 2-lipped; upper lip emarginate; lower lip 3-cleft. Stamens 4, 2 shorter. Nutlets ovoid, smooth. (Greek name of the honey-bee; the flowers are very sweet.) E.

M. officinalis L.

POGOGYNE

Herbs, annual, ours 10—30 cm. high. Leaves mostly entire; in ours oblanceolate to obovate, petioled, 1.8—3 cm. long. Flowers many, small, in spikes; spikes dense or interrupted, terminal, bracted. Calyx unequally 5-cleft; tube campanulate or turbinate, 15-veined; teeth hirsute-ciliate. Corolla straight, tubular-funnelform, 2-lipped, white with purple dots (ours); lips short; upper lip erect, entire; lower lip 3-lobed, spreading. Stamens 4, upper 2 shortest, lower 2 sometimes antherless. Style somewhat exerted, bearded above. (Gk. pogon=a beard, gyne=the pistil; referring to the bearded style.) U.

P. douglasii Benth.

MADRONELLA (Monardella)

Herb or somewhat shrubby, annual or perennial. Leaves mostly entire. Flowers small, purple or red or white, bracted, in terminal heads; bracts wide, often membranous, often colored. Calyx tubular, 10—13-veined, 5-toothed; teeth short, nearly equal, straight. Corolla-tube as long as the calyx; throat glabrous inside; limb somewhat 2-lipped; upper lip 2-cleft; lower lip 3-cleft, the lobes nearly equal. Stamens 4, equal or the lower 2 longer, exerted. (An anagram of Monardella, the diminutive of *Monarda*.)

A. Leaves white-tomentose or tomentulose beneath.

B. Leaves paler beneath than above, veins not prominent. C. E.

M. discolor Gr.

BB. Leaves not paler beneath, veins prominent. E.

M. nervosa Gr.

AA. Leaves not so beneath.

C. Plant somewhat canescent. U.

M. villosa (Benth.)

CC. Plant glabrous or puberulent except the inflorescence.

D. Leaves not as long as the stem-internodes. U. E. (Apparently *M. parvifolia*.)

M. reflexa (How.)

DD. Leaves mostly longer than the stem-internodes.

E. Plant very smooth and shining except the inflorescence; leaves obtuse. E.

M. purpurea Nels.

EE. Plant somewhat ashy-gray with scurfy puberulence; leaves acute. E.

M. odoratissima Gr.

LYCOPUS.**WATER HOREHOUND**

Herbs, perennial by slender stolons or suckers; stems erect or diffuse. Leaves sessile or petioled, in ours lanceolate or wider. Flowers small, white or purple, bracted, whorled in dense axillary clusters. Calyx campanulate, regular or nearly so, 4—5-toothed. Corolla campanulate to cylindric, equaling or exceeding the calyx; limb either nearly equally

4-cleft or else one of the lobes wider and emarginate. Stamens 2 or 4, only 2 with anthers. Nutlets truncate at tip, narrowed below, 3-angled, smooth. (Gk. lykos=a wolf, pous=a foot; from a fancied resemblance in the leaves.)

A. All of the leaves or all but the upper ones irregularly incised or laciniate-pinnatifid. W. E. *L. americanus* Muhl.

AA. Leaves merely serrate.

B. Calyx-teeth lanceolate or deltoid, obtuse or barely acutish, shorter than the mature nutlets. W. C. E. (*L. virginicus* for our region.)

L. uniflorus Michx. (Bugle-weed)

BB. Calyx-teeth narrow, very acute, longer than the mature nutlets.

C. Leaves short-petioled; bracts about half the length of the calyx; corolla almost twice as long as the calyx. W.

L. rubellus Moench.

CC. Leaves sessile or very short-petioled; bracts almost as long as the calyx; corolla very little longer than the calyx. E.

L. lucidus Turcz.

MENTHA

MINT

Herbs, perennial, erect or diffuse, with mint odor. Leaves simple, sessile or petioled, mostly punctate. Flowers small, whorled, purple or pink or white; whorls axillary or in spikes; spikes terminal. Calyx campanulate to tubular, 10-veined, regular to slightly 2-lipped, 5-toothed. Corolla-tube shorter than the calyx; limb 4-cleft, slightly irregular; upper lobe usually wider, entire or emarginate. Stamens 4, equal. Nutlets ovoid, smooth. (Minthe was a nymph whom the Greeks believed was changed into a Mint.)

A. Stems finely retrorse-pubescent at least on the angles; flowers in the axils of ordinary leaves.

B. Leaves pubescent; stem pubescent on the sides and angles. W. E. (*M. canadensis lanata*.)

M. canadensis L. (Field Mint)

BB. Leaves glabrous; stem glabrous on the sides, minutely pubescent on the angles.

W. C. E. (*M. canadensis borealis*; *M. occidentalis*.)

M. canadensis glabrata Benth.

AA. Stems glabrous or nearly so, hairs when present not retrorse; most of the flowers in the axils of bracts.

C. Leaves sessile or nearly so; flowers sessile. W. E. (*M. spicata viridis*.)

M. spicata L. (Spear-mint)

CC. Leaves petioled; flowers pedicelled.

D. Calyx-teeth hairy; leaves ovate-oblong to lance-oblong, acute; garden escape.

W.

M. piperita L. (Peppermint)

DD. Calyx-teeth glabrous; leaves ovate, obtuse or the upper acute. W.

M. citrata Ehrh. (Bergamot Mint)

MICROMERIA

YERBA BUENA

Herbs (ours) or shrubs, ours a prostrate vine. Leaves entire or merely dentate (ours). Flowers small, in bracted spikes or few in the leaf-axils (ours). Calyx tubular, 13—15-veined, regular or somewhat 2-lobed, 5-toothed. Corolla short; tube straight, usually about equaling the calyx; limb 2-lipped; upper lip erect, entire or emarginate; lower lip spreading, 3-lobed. Stamens 4, included, 2 shorter. (Gk. mikros=small, meros=a division; referring to the slightly 2-lipped perianth.) W. C. (*M. chamissonis*.)

M. douglasii Benth. (Tea Vine)

SOLANACEAE**Potato Family**

Herbs or shrubs or trees (not ours), sometimes vines. *Leaves alternate* (ours) or rarely opposite, entire to dissected, pinnately veined (ours); *stipules none*. *Flowers perfect, regular*, often large, either solitary in the leaf-axils or stem-forks, or else clustered. Calyx mostly 5-toothed or -lobed. Corolla rotate or campanulate or salverform or funnel-form or tubular, mostly 5-lobed. *Stamens* as many as corolla-lobes, alternate with them, *on the corolla-tube, all equal in length and perfect* (ours). *Ovary terete, superior, 2—8-celled*; style slender, simple. *Fruit a berry or a capsule*. Seeds many.

- A. Corolla rotate or campanulate; fruit a berry, 2-celled.
- B. Flowers solitary in the leaf-axils; calyx in fruit enlarged, bladdery; corolla campanulate; anthers distinct. **PHYSALIS** (p. 339)
- BB. Flowers in clusters; calyx in fruit not conspicuously enlarged, not bladdery; corolla rotate; anthers closely fitted together into a cone. **SOLANUM** (p. 339)
- AA. Corolla tubular or salverform or funnellform; fruit a capsule, often more than 2-celled.
- C. Leaves dentate; flowers solitary in the forks of the stems; capsule prickly. **DATURA** (p. 340)
- CC. Leaves entire; flowers in clusters; capsule not prickly. **NICOTIANA** (p. 340)

PHYSALIS**GROUND CHERRY**

Herbs, annual or perennial. Leaves entire or sinuately toothed. Flowers solitary in the leaf-axils (ours), peduncles slender. Calyx campanulate; in fruit enlarged and bladdery-inflated, membranous, 5—10-angled or -ribbed, wholly enclosing the fruit, its teeth usually meeting. Corolla whitish or yellowish, with dark center (ours), open-campanulate or rarely campanulate-rotate, plicate. Stamens near base of corolla. Stigma minutely 2-cleft. Berry pulpy. Seeds kidney-shaped, flattish, with thin edge, finely pitted. (Gk. *physalis*=a bladder, from the inflated calyx.)

- A. Annual; leaves ovate to cordate or rarely some lanceolate, some of them always somewhat sinuate-toothed.
- B. Plant glabrous or merely puberulent; calyx in fruit obscurely 5—10-angled. E. **P. ixocarpa** Brit. (Tomatillo)
- BB. Plant pubescent; calyx in fruit sharply 5-angled. E. (*P. pruinosis* for our region.) **P. pubescens** L.
- AA. Perennial; leaves lanceolate to oblanceolate, entire or sinuate but not sinuate-toothed; stems glabrous to sparingly hirsute-pubescent. E. **P. lanceolata** Michx.

SOLANUM**NIGHTSHADE**

Herbs or shrubs, annual or perennial, sometimes climbing, often stellate-pubescent. Leaves alternate, in ours entire to 3-foliolate. Flowers in cymes or umbels or panicles or racemes, white or blue or purple or yellow. Calyx campanulate or rotate; in fruit either enclosing the berry or persistent at its base. Corolla rotate, limb plicate; tube very short. Stamens on throat of corolla. Ovary usually 2-celled. Berry mostly globose. (Said to be from L. *solamen*=quieting; the Bittersweet is mildly narcotic.)

- A. Plant not prickly; corolla 8—20 mm. wide; anthers not tapering upward; calyx in fruit not spiny, not nearly covering the berry.
- B. Climbing or twining; without stellate pubescence; leaves either entire or else with a lobe or leaflet near the base at one side or both sides but otherwise entire; perennial. W. E. **S. dulcamara** L. (Bittersweet)

- BB. Not climbing nor twining; leaves either entire or else some of them irregular-dentate or -lobed.
- C. Annual; hairs simple; corolla 8—10 mm. wide; leaves not all entire, often rounded or cordate at base; berry green or black or yellow.
- D. Leaves oblong, pinnately 7—9-lobed; berries green. E.
S. triflorum Nutt. (Wild Tomato)
- DD. Leaves ovate, merely wavy-toothed; berries black or yellow.
- E. Plant nearly glabrous; filaments hairy; berry black. W. C. E.
S. nigrum L. (Common Nightshade)
- EE. Plant viscid-pubescent or villous; filaments glabrous; berry yellow. U.
 (S. *villosum*.) *S. nigrum villosum* L.
- CC. Perennial; hairs stellate; corolla 16—20 mm. wide; leaves all entire, acute or narrowed at base; berry purple. U.
S. umbelliferum Esch.
- AA. Plant prickly; corolla 25—50 mm. wide; anthers tapering upward; calyx in fruit spiny, nearly or wholly covering the berry.
- F. Corolla white or light blue; anthers equal; fruit only partly covered by the calyx. W.
S. sisymbriifolium Lam.
- FF. Corolla yellow; anthers unequal, the lowest much the longest; fruit quite covered by the calyx. E. *S. rostratum* Dum. (Buffalo Bur)

DATURA

THORN-APPLE

Herbs, annual (ours) or perennial, erect, tall, branching, narcotic. Leaves entire or sinuate-dentate or lobed. Flowers large, solitary in the forks of the stem, erect, short-peduncled, white or purple or violet. Calyx elongated-tubular or prismatic, circumscissile near the persistent base (ours). Corolla funnelform; limb plicate; lobes wide, acuminate. Stamens at or below the middle of corolla-tube. Ovary 2-celled or falsely 4-celled; stigma slightly 2-lobed. Capsule globose or ovoid, prickly, 4-valved from tip or bursting irregularly. (From tatorah, the Arabic name.)

- A. Stem green; corolla white; lower prickles of the fruit shorter than the others. E.
D. stramonium L. (Stramonium)
- AA. Stem purple; corolla purple or violet; prickles of the fruit all of the same length. E.
D. tatula L. (Purple Thorn-apple)

NICOTIANA

TOBACCO

Herbs, annual or perennial. Leaves large, simple. Flowers rather large, white (ours) or yellow or green (ours) or purple, in terminal racemes or panicles, often bracted. Calyx tubular-campanulate or ovoid, 5—8-cleft, at least its lower part persistent. Corolla funnelform or salverform, plicate, limb 5—8-lobed. Ovary 2—8-celled; stigma capitate or 2-lobed. Capsule septicidal and mostly also loculicidal at tip. Seeds very small, granulate or rugose. (Honor of J. Nicot, a French Ambassador, who early sent tobacco seed to Italy.)

- A. Leaves all with slender petioles; corolla-limb 8—12 mm. wide; calyx-teeth much shorter than its tube. E. *N. attenuata* Torr.
- AA. Leaves or some of the upper ones sessile; corolla-limb 20—40 mm. wide; calyx-teeth about equaling its tube.
- B. Corolla 25—50 mm. long; capsule 2-celled. U.
N. bigelovii Wats.
- BB. Corolla 20—25 mm. long; capsule 3—8-celled.

- C. Capsule 3—4-celled, 8—12 mm. long; calyx and corolla and stamens in 5's.
 U. E. N. quadrivalvis Pursh
 CC. Capsule 4—8-celled, 12—25 mm. long; calyx and corolla and stamens in
 5's to 8's. U. E. N. quadrivalvis multivalvis Gray

SCROPHULARIACEAE

Figwort Family

Herbs or shrubs or trees (not ours). Leaves alternate or opposite or whorled; *stipules none*. Flowers perfect, mostly complete, mostly irregular. Calyx persistent, 1—5-toothed to -divided, sometimes split on the lower or upper side or both. *Corolla sympetalous*, rarely none in *Synthyris*; *limb 2-lipped or nearly regular*, variously colored. Anther-bearing stamens 2—5, 2 often shorter, on the corolla, alternate with the corolla-lobes; antherless stamens often present. *Pistil 1, entire or 2-lobed*; *ovary superior*, 2-celled or rarely 1-celled; ovules few to many; *placenta central*; style 1, slender; stigma entire or forked. Fruit a capsule (ours), septicidal or loculicidal or opening by pores. Seeds few or many.

A. Herbs.

B. Leaves alternate.

- C. Vines; leaves reniform-orbicular, palmately veined, lobed or coarsely dentate.
 ANTIRRHINEAE (p. 342)

CC. Not as above in all points.

- D. Mud plants, creeping or floating; leaves glabrous; leaves nearly all basal, entire, linear to oblong.
 GRATIOLEAE (p. 349)

DD. Not as above in all points.

- E. Corolla spurred or saccate at base on the lower side.
 ANTIRRHINEAE (p. 342)

EE. Corolla neither spurred nor saccate at base on the lower side, but sometimes saccate at base on the upper side.

F. Calyx 5-toothed or -lobed.

- G. Corolla rotate; anther-bearing stamens 5. VERBASCEAE (p. 342)

GG. Corolla tubular; anther-bearing stamens 4, rarely 5 in *Pentstemon*.

H. Leaves entire to dentate; corolla not produced into a long projection.

- I. Leaf-blade 0.6—10 cm. long; 5th sterile stamen represented by a filament on the corolla.
 CHELONEAE (p. 343)

- II. Leaf-blade 8—20 cm. long; 5th sterile stamen not represented at all.
 DIGITALEAE (p. 352)

HH. Leaves either pinnately-lobed or -parted, or else corolla produced into long and elephant-trunk-like projection.

RHINANTHEAE (p. 342)

FF. Calyx 1—4-toothed or -lobed.

- J. Corolla nearly regular, rotate or shortly campanulate, never yellow.
 DIGITALEAE (p. 352)

- JJ. Corolla distinctly 2-lipped, tubular, often yellow.
 RHINANTHEAE (p. 354)

BB. Leaves opposite or whorled.

K. Calyx 5-toothed or -lobed.

- L. Corolla gibbous or spurred at base on lower side; seeds many.
 ANTIRRHINEAE (p. 342)

- LL. Corolla gibbous at base on upper side; seeds few. CHELONEAE (p. 343)

- LLL. Corolla neither gibbous nor spurred at base on any side; seeds many.

- M. Leaves nearly all basal, entire, linear; stem-leaves only 2—4.
CHELONEAE (p. 343)
- MM. Not as above in all points.
- N. Calyx deeply cleft at the front or the rear or both.
RHINANTHEAE (p. 354)
- NN. Calyx about equally notched into 5 teeth or lobes.
- O. Flowers solitary in the leaf axils, either with 4 anther-bearing stamens and no rudiment of a 5th stamen, or else with 2 anther-bearing stamens and 2 rudimentary ones.
GRATIOLEAE (p. 349)
- OO. Flowers in terminal or axillary clusters, with 4 anther-bearing stamens and the rudiments of a 5th stamen.
CHELONEAE (p. 343)
- KK. Calyx 1—4-toothed or -lobed.
- P. Corolla regular or nearly so, rotate to salverform, never yellow; stamens 2.
DIGITALEAE (p. 352)
- PP. Corolla plainly 2-lipped, tubular, often yellow; stamens 4.
RHINANTHEAE (p. 354)
- AA. Shrubs.
- Q. Plant with young parts glutinous, 6—18 dm. high; leaves 2.5—10 cm. long, pubescent beneath with branched hairs.
GRATIOLEAE (p. 349)
- QQ. Plant not glutinous, 1—6 dm. high; leaves 0.6—5 cm. long, not pubescent beneath with branched hairs.
CHELONEAE (p. 343)

VERBASCEAE (MULLEIN TRIBE)—Herbs, biennial or perennial, 6—30 dm. high (ours), erect. Leaves all alternate, pinnately veined, entire to pinnatifid, 10—30 cm. long (ours). Flowers in racemose or spike-like clusters. Calyx 5-toothed or -lobed. Corolla rotate, slightly irregular, not spurred nor saccate at base, white or yellow. Anther-bearing stamens 5. Capsule septicidal. Seeds many.

VERBASCUM

MULLEIN

Leaves pinnatifid or dentate or entire. Flowers rather large. Calyx deeply 5-cleft. Corolla 5-lobed. Stamens on base of corolla, unequal; filaments at least of the upper 3 stamens pilose. Ovary 2-celled. Capsule globose to oblong; 2-valved; valves usually 2-cleft at apex. Seeds rugose, not winged. (L. *barbascum*=bearded; on account of its hairiness.)

- A. Plant densely woolly; stem-leaves strongly decurrent; flowers in a dense terminal spike; filaments of 3 upper stamens hairy, those of two lower ones glabrous. W. E.
V. thaspus L. (Common Mullein)

- AA. Plant nearly glabrous; leaves not decurrent; flowers in a loose terminal raceme; filaments of all 5 stamens hairy. E.

V. blattaria L. (Moth Mullein)

ANTIRRHINEAE (SNAP-DRAGON TRIBE)—Herbs, annual or biennial or perennial, erect to vines. Leaves alternate or rarely opposite, pinnately veined and entire or palmately veined and lobed. Flowers in racemes or spike-like clusters or solitary in the leaf-axils. Calyx 5-toothed or -lobed. Corolla somewhat tubular, 2-lipped, spurred or saccate at base in front, variously colored. Anther-bearing stamens 4, the 5th antherless or gone entirely. Capsule opening by pores. Seeds many.

- A. Plant a vine; leaves palmately veined, lobed.
CYMBALARIA (p. 343)
- AA. Plant erect or spreading, not a vine; leaves pinnately veined, entire.
- B. Leaves sessile; corolla spurred at base.
LINARIA (p. 343)

BB. Leaves short-pedicelled; corolla merely saccate at base.

ANTIRRHINUM (p. 343)

CYMBALARIA

Perennial, creeping (ours) or spreading, vine-like (ours). Leaves alternate, palmately veined, lobed to dentate; in ours reniform-orbicular, 6—25 mm. wide. Flowers white to violet, in ours blue to lilac, solitary in the leaf-axils. Calyx 5-parted. Corolla short-spurred; upper lip 2-lobed; lower lip 3-lobed; throat nearly or quite closed. Stamens included, 5th stamen gone entirely. Capsule-pores 2, terminal, 3-toothed. Seeds small. Cultivated, rarely escaped. (Gk. kymbalon—a cymbal; referring to the leaf-form.) W.
C. cymbalaria Wettst. (Kenilworth Ivy)

LINARIA

TOAD-FLAX

Annual or biennial or perennial, ours erect or spreading. Leaves alternate or some of the lower ones opposite or whorled, pinnately- or 1-veined; in ours linear or linear-oblong, entire. Flowers in racemes or spikes, in ours yellow or blue; clusters terminal, bracted. Calyx-segments imbricated. Upper lip of corolla erect, 2-lobed, covering the lower in bud; lower lip spreading, 3-lobed. Stamens included, 5th stamen represented by a gland on the inside of the corolla. Capsule ovoid or globose; pores 1 or more, mostly 3-toothed. Seeds winged or wingless, angled or rugose. (L. linum=flax, which some species resemble.)

A. Perennial by short rhizomes, pale-green, slightly glaucous, sometimes slightly hairy; flower yellow, 25—32 mm. long; seeds rugose, winged. W. E. (*L. linaria*.)

L. vulgaris Mill. (Butter-and-eggs)

AA. Annual or biennial, green, not pale, not glaucous, glabrous; flower blue, 6—8 mm. long; seed angled, wingless. W. E.

L. canadensis Dum.

ANTIRRHINUM

SNAP-DRAGON

Annual or perennial. Leaves alternate or the lower and those of sterile shoots opposite, entire (ours). Flowers mostly large, white or red or purple or yellow, solitary in the leaf-axils or in terminal racemes. Calyx 5-parted; segments imbricated. Corolla saccate but not spurred, upper lip erect, 2-lobed; lower lip spreading, 3-lobed; throat nearly closed. Stamens 4, 2 shorter, included, the 5th represented by a gland inside the corolla-tube. Capsule ovoid or globose. Seeds oblong, truncate, rugose or smooth, not winged. Cultivated or escaped or accidentally introduced. (Gk. anti=like, rhin=a snout; referring to the form of the corolla.)

A. Annual; corolla 6—16 mm. long.

B. Calyx-segments 10—14 mm. long, linear; corolla purple, 10—15 mm. long. W.

A. orontium L.

BB. Calyx-segments 2—4 mm. long, subulate; corolla dull purple, 8—16 mm. long.

U. C. *A. leptopetalum* Gray

BBB. Calyx-segments 4—8 mm. long, oblong; corolla dull white, 6—8 mm. long.

E. *A. kingii* Wats.

AA. Perennial; corolla 20—30 mm. long; escaped from gardens. W.

A. majus L. (Garden Snap-dragon)

CHELONEAE (BEARD-TONGUE TRIBE)—Herbs or shrubs, annual or perennial, prostrate or erect or almost acaulescent but ours not vines. Leaves opposite or rarely alternate or whorled, entire to divided, pinnately veined or several-veined from the base.

Flowers either in clusters, or else solitary in the leaf-axils and often peduncles bracted. Calyx 5-toothed or -lobed. Corolla saccate at base on upper side or without basal swelling. Anther-bearing stamens 4, 5th sterile stamen represented by a gland or a filament. Capsule septicidal or loculicidal. Seeds few or many.

A. Annual; corolla saccate at base on upper side, not green nor yellow nor brown nor purple; 2—16 mm. long; leaves entire to divided; seeds few.

B. Corolla deeply 2-lipped, 6—16 mm. long, blue or pink or variegated; leaves entire to lobed. COLLINSIA (p. 344)

BB. Corolla obscurely 2-lipped, 2—10 mm. long, blue or white; leaves lobed to 3—5-divided. TONELLA (p. 345)

AA. Perennial; corolla not swollen at base, often green or yellow or brown or purple, often more than 16 mm. long; leaves entire to toothed; seeds many.

C. Plant not as in CC in all points.

D. Corolla greenish- or purplish-brown, 8—10 mm. long; 5th and antherless stamens represented by a scale on the corolla; herbs. SCROPHULARIA (p. 345)

DD. Corolla often some other color, usually longer; 5th and antherless stamen a tongue-like filament on the corolla.

E. Herbs; corolla never white nor yellow; antherless stamen shorter than the others; seed winged. CHELONE (p. 345)

EE. Herbs or shrubs; corolla sometimes white or yellow; antherless stamen about equaling the others; seed wingless. PENTSTEMON (p. 346)

CC. Plant an herb, 2—8 cm. high, glabrous; leaves linear, entire, only 2—4 on the flowering stems. CHIONOPHILA (p. 349)

COLLINSIA

BLUE-LIPS

Herbs, annual, low. Leaves opposite or whorled. Flowers blue or pink or variegated, in the axils of the upper leaves, whorled or solitary; pedicels bractless. Calyx campanulate, 5-cleft. Corolla-tube short, gibbous or saccate; limb deeply 2-lipped, upper lip 2-cleft, its lobes erect or recurved; lower lip larger, 3-lobed, its lateral lobes spreading or drooping, its middle lobe a keel-like sac enclosing the stamens and style. Lower 2 stamens inserted higher up on the corolla, 5th stamen represented by a gland. Capsule ovate or globose, septicidal and later also loculicidal. Seeds few, peltate, concave ventrally. (Honor of Z. Collins, an American botanist.)

A. Inflorescence glandular.

B. Plant 5—10 cm. high; lower leaves orbicular to oblong; pedicels bent back in fruit; flowers many; calyx-lobes broadly subulate, acute; seed oblong, nearly terete, not winged. U. C. C. *torreyi* Gray

BB. Plant 15—45 cm. high; lower leaves spatulate; pedicels erect in fruit; flowers 1—6 in a whorl; calyx-lobes lanceolate to triangular, somewhat obtuse; seed saucer-shaped, winged. C. E. (C. *glandulosa*.)
C. *rattani* Gray

AA. Inflorescence not glandular.

C. Calyx-lobes 2 or more times as long as the calyx-tube; pedicels erect in fruit.

D. Glabrous thruout; flowers usually solitary in the upper axils. W. C. *multiflora* How.

DD. Glabrous thruout; flowers usually solitary in the upper axils. W. C. *sparsiflora* F. & M.

CC. Calyx-lobes scarcely longer than the calyx-tube.

- E. Leaves all linear, all entire or a few of the lower obscurely dentate; pedicels erect in fruit. U. *C. linearis* Gray
- EE. Leaves not all linear, at least the lower wider, nearly always at least the lower ones distinctly toothed or notched.
- F. Corolla 8—18 mm. long, its tube shorter than the limb.
- G. Corolla 8—10 mm. long; pedicels erect in fruit. W. C. (*C. grandiflora pusilla*.) *C. pusilla* How.
- GG. Corolla 12—18 mm. long; pedicels bent back in fruit. W. C. *C. grandiflora* Dougl.
- FF. Corolla 5—7 mm. long, its tube longer than the limb; pedicels bent back in fruit. W. C. E. (*C. minima*; *Collinsonia tenella*.) *C. parviflora* Dougl.

TONELLA

Herbs, annual, small. Leaves opposite, simple or compound. Flowers small, ours white or blue; in axillary whorls (ours); peduncles filiform, bractless. Calyx campanulate, 5-lobed. Corolla slightly gibbous at base, obscurely 2-lipped, 5-lobed; lobes somewhat rotately spreading. Stamens 4, not enclosed in the lower lip of the corolla, the lower 2 inserted on the corolla, 5th stamen represented by a rudiment. Capsule subglobose, septicidal. Seeds 2—4, ovate, convex on the back, concave on the other side. (Origin?)

- A. Stem weak and filiform; corolla 2—3 mm. wide; ovules and seeds 1 in each cell. C. E. *T. collinsioides* Nutt.
- AA. Stem stout; corolla 6—10 mm. wide; ovules and seeds 3—4 in each cell. E. *T. floribunda* Gray

SCROPHULARIA

FIGWORT

Herbs (ours) or shrubs, perennial, odorous. Leaves opposite (ours), large. Flowers small, purple or greenish or yellow, in clusters. Calyx 5-lobed. Corolla-tube globose to oblong, neither gibbous nor spurred; limb 5-lobed; 2 upper lobes longer, erect; lateral lobes ascending; lower lobes spreading or reflexed. Stamens with anthers 4, 2 shorter, mostly included, 5th stamen a scale on corolla. Capsule ovoid, septicidal. Seeds many, rugose, not winged. So named because reputed a cure for scrofula.) W. C. E. (*S. occidentalis*; *S. marylandica*; *S. serrata*.)

S. californica Cham.

CHELONE

TURTLE-HEAD

Herbs, perennial, ours glabrous below the inflorescence. Leaves opposite; in ours ovate to lanceolate, serrate, short-petioled. Flowers large, white (not ours) or red or purple or violet, in dense clusters. Calyx 5-lobed, bracted at base; segments ovate to lanceolate. Corolla 25—34 mm. long (ours); tube elongated, enlarged above; limb 2-lipped; upper lip concave, emarginate or entire, exterior in bud; lower lip spreading, 3-lobed. Stamens 4, included, 2 longer; 5th stamen a small antherless filament; anthers woolly. Capsule ovoid, septicidal. Seeds many, flattish, winged. (Gk. *chelone*=a turtle; the corolla has the shape of a turtle-head.) W. C. E.

C. nemorosa Dougl.

PENTSTEMON

BEARD-TONGUE

Herbs or shrubs, perennial, ours 1—9 dm. high. Leaves opposite, sometimes partly alternate or whorled. Flowers various in color, in terminal clusters. Calyx 5-lobed; segments imbricated. Corolla-tube not gibbous; throat ample; limb 2-lipped; upper lip 2-lobed; lower lip 3-lobed. Stamens 4, included, 2 shorter; 5th stamen a mere filament. Seeds many, angled, not winged. (Gk. pente=5, stemon=stamen; because the 5th stamen is conspicuous, altho antherless.)

A. Anthers densely woolly with long hairs; shrubs or shrubby at base.

GROUP 1 (p. 346)

AA. Anthers not densely woolly.

B. Corolla white or yellowish.

GROUP 2 (p. 346)

BB. Corolla red or blue or purple or violet.

C. Leaves all or nearly all entire.

GROUP 3 (p. 347)

CC. At least most of the leaves not entire.

GROUP 4 (p. 348)

GROUP 1

A. Leaves green, not glaucous.

B. Leaf-blades 7.5—12.5 cm. long, linear to linear-lanceolate, serrulate. E.

P. lyallii Gray

BB. Leaf-blades less than 7.5 cm. long, often wider than lanceolate.

C. Leaves entire.

D. Leaves 12—38 mm. long; plant not prostrate. (See EE.)

DD. Leaves 6—12 mm. long; plant prostrate except the short annual branches.

W. C. (*P. davidsonii*.)

P. menziesii davidsonii Pip.

CC. Leaves not entire.

E. Plants prostrate; leaves 6—20 mm. long, obovate. W. C.

P. menziesii Hook.

EE. Plants erect to spreading, not prostrate; leaves often longer, often not obovate. C. E. (*P. lewisii*; *P. douglasii*; *P. adamsianus*; *P. caldwellii*; *P. fruticosus caldwellii*; *P. scouleri*; *P. woodsii*.)

P. fruticosus Gr.

AA. Leaves glaucous.

F. Branches prostrate; leaves ovate to orbicular, petioled, puberulent; corolla rose-crimson. C.

P. rupicola How.

FF. Branches erect; leaves ovate to lanceolate, sessile, glabrous; corolla lilac-purple.

C.

P. barrettae Gray

GROUP 2

A. Inflorescence viscid-pubescent.

B. Leaves entire or nearly all so.

C. Corolla 16—25 mm. long, yellow or or ochroleucous.

D. Leaves nearly all entire. C. E.

P. pinetorum Pip.

DD. Leaves nearly all not entire. C. E. (*P. confertus globosus*.)

P. attenuatus Dougl.

CC. Corolla 12—16 mm. long, white. E.

P. humilis Nutt.

BB. Leaves dentate or nearly all so; corolla 20—25 mm. long. E. (*P. stenosepalus*.)

P. glaucus stenopetalus Gray

- AA. Inflorescence glabrous.
 - E. Leaves entire or nearly all so; corolla pale yellow. C. E.
P. confertus Dougl.
- EE. Leaves all or nearly all not entire; corolla ochroleucous or dull-white.
 - F. Leaves ovate to linear-lanceolate, dentate; sterile filaments glabrous. E.
P. deustus Dougl.
- FF. Leaves linear-lanceolate, denticulate; sterile filaments bearded. E. (*P. paniculatus*.)
P. variabilis Suks.

GROUP 3

- A. Plant glabrous or very nearly so, never glandular-hairy.
- B. Corolla 25—38 mm. long.
 - C. Plants herbaceous at base; sterile filament bearded.
 - D. Plant 3—6 dm. high; upper leaves not greatly reduced in size. E.
P. glaber Pursh
 - DD. Plant taller; upper leaves greatly reduced in size. E.
P. glaber speciosus Rydb.
 - CC. Plants woody at base; sterile filament glabrous.
 - E. Plant plainly glaucous; corolla broadly funnelform. U.
P. azureus Benth.
 - EE. Plant hardly glaucous; corolla with narrow tube. U. C.
P. heterophyllus Lindl.
- BB. Corolla 10—18 mm. long.
 - F. Leaves narrowly linear.
 - G. Plant glabrous; leaves 10—25 mm. long, about 0.5 mm. wide, densely crowded near base and some scattered along stem; sterile filaments bearded on upper side. E. *P. larcifolium* H. & A.
 - GG. Plant puberulent; leaves 25—50 mm. long, 2—6 mm. wide, somewhat equally scattered along stem; sterile filaments glabrous. E.
P. cusickii Gray
 - FF. Leaves wider than linear, merely some of the uppermost linear.
 - H. Plant glaucous; leaves coriaceous. E.
P. acuminatus Dougl.
 - HH. Plant not glaucous; leaves not coriaceous.
 - I. Flowers loosely clustered; peduncles viscid-puberulent; sepals not erose nor scarious-margined. E.
P. gracilentus Gray
 - II. Flowers in 2—3 head-like clusters; peduncles glabrous; sepals erose and scarious-margined. W. C. E. (*P. pulchellus*.)
P. procerus Dougl.
- AA. Plant not glabrous, usually glandular-hairy above and sometimes below.
 - J. Stem-leaves oblanceolate to spatulate. E.
P. kingii Wats.
 - JJ. Stem-leaves not oblanceolate nor spatulate except occasional leaves.
 - K. Stem not ashy-puberulent.
 - L. Stem-leaves linear; basal-leaves narrowly spatulate.
 - M. Stem-leaves all opposite; sepals about 4 mm. long; corolla nearly tubular, 1.6—2 cm. long. E. (*P. oreganus*.)
P. gairdneri oreganus Gray
 - MM. Uppermost stem-leaves alternate; sepals 5—10 mm. long.
 - N. Calyx 5—8 mm. long; corolla nearly tubular, 1.2—2 cm. long. (*P. macbridei*.) C. E. *P. gairdneri* Hook.

- NN. Calyx 8—10 mm. long; corolla distinctly funnelform, 2—3 cm. long. E. *P. gairdneri hians* Pip.
- LL. Stem-leaves lanceolate to spatulate; basal leaves often wider.
- O. Basal leaves elliptic-oblong; stem-leaves spatulate to oblong. C. E. *P. collinus* Nels.
- OO. Basal leaves spatulate to obovate; stem-leaves lanceolate.
- P. Inflorescence glandular-viscid; sepals lanceolate. E. *P. miser* Gray
- PP. Inflorescence not glandular; sepals ovate. E. *P. perpulcher* Nels.
- KK. Stem ashy-puberulent at least up to the inflorescence.
- Q. Leaves linear to ovate; sterile filament bearded at tip. C. E. (*P. confertus globosus*.) *P. attenuatus* Dougl.
- QQ. Leaves linear to oblanceolate; sterile filament glabrous. C. E. *P. roezli* Regel.

GROUP 4

- A. Inflorescence glabrous or nearly so up to the calyx.
- B. Corolla minutely pubescent inside; 8—16 mm. long; often yellowish or whitish. E. *P. deustus* Dougl.
- BB. Corolla glabrous inside.
- C. Stem-leaves linear to lanceolate, often in whorls of 3; corolla 10—16 mm. long. E. *P. triphyllus* Dougl.
- CC. Stem-leaves often wider, none in whorls of 3; corolla 16—27 mm. long.
- D. Leaves often alternate, coarsely dentate or lobed; corolla red to purple; sepals acute. C. E. *P. richardsonii* Dougl.
- DD. None of the leaves alternate, finely serrate or dentate; corolla blue; sepals acuminate. W. C. *P. diffusus* Dougl.
- AA. Inflorescence pubescent or puberulent.
- E. Leaves glandular-pubescent. E. *P. glandulosus* Lindl.
- EE. Leaves not glandular-pubescent.
- F. Stem glabrous below the inflorescence.
- G. Corolla 1.2—2 cm. long.
- H. Stem-leaves lanceolate to linear-lanceolate. E. *P. dayanus* How.
- HH. Stem-leaves oblong or wider.
- I. Calyx glandular. C. E. *P. pinetorum* Pip.
- II. Calyx not glandular. U. E. *P. rattani minor* Gray
- GG. Corolla 2—3.2 cm. long.
- J. Sepals lanceolate, 6—8 mm. long.
- K. Inflorescence not head-like. U. E. *P. rattani* Gray
- KK. Inflorescence head-like. E. (*P. stenosepalous*.) *P. glaucus stenosepalus* Gray
- JJ. Sepals ovate, 2—4 mm. long. E. *P. venustus* Dougl.
- FF. Stem puberulent or pubescent below the inflorescence.
- L. Basal leaves all or nearly all entire.
- M. Inflorescence narrow, wand-like.
- N. Stem hoary-puberulent or -pubescent. E. *P. pruinosis* Dougl.
- NN. Stem not so.
- O. Leaves 2.5 cm. or less long, lower ones spatulate or oblanceolate, upper ones oblong or linear-oblong. E. *P. humilis* Nutt.

- OO. Leaves 3—10 cm. long, some of the lower and of the upper wider than oblong. E. (*P. whitedii.*)
P. erianthera Pursh
 MM. Inflorescence wider, looser, not wand-like. (See I.)
 LL. Basal leaves all or nearly all not entire.
 P. Plant 6—12 dm. high; sterile filament bearded at tip. C.
P. ovatus Dougl.
 PP. Plant 1—3 dm. high.
 Q. Sterile filament yellow-hairy along one side nearly to base. (See OO.)
 QQ. Sterile filament without hairs. E.
P. montanus Gr.

CHIONOPHILA

Herbs, perennial, 2.5—7.5 mm. high (ours). Leaves opposite, thickish; in ours entire, linear. Flowers in spikes or racemes (ours). Calyx funnelform, membranous, becoming scarious, obtusely 5-lobed. Corolla tubular; throat slightly dilated; limb 2-lipped; upper lip erect, slightly concave, barely 2-lobed; lower lip with densely bearded convex base, 3-lobed; its lobes short and recurved. Anther-bearing stamens 4, 2 shorter; 5th stamen a short or minute filament. Capsule oblong, enclosed in the marcescent calyx and corolla, loculicidal, 2-valved, the valves soon 2-parted. Seeds rather large, outer coat very loose. (Gk. Chion=snow, phileo=I love; from its habitat.) E.
C. tweedyi Hend.

GRATIOLEAE (MONKEY-FLOWER TRIBE)—Herbs or shrubs, annual or biennial or perennial, erect to creeping or floating. Leaves opposite or alternate or all basal, pinnately or palmately veined, entire to toothed, 0.6—16 cm. long (ours). Flowers solitary on scape-like peduncles or in the leaf-axils, or somewhat in terminal racemes by the reduction of the upper leaves. Calyx 5-toothed or -lobed. Corolla somewhat tubular, not swollen at base, variously colored. Either anther-bearing stamens 4 and antherless ones 0, or else anther-bearing stamens 2 and antherless ones 2; 5th stamen not represented. Capsule dehiscent by valves. Seeds many.

- A. Shrubs, young parts glutinous, 6—18 dm. high; leaves opposite; flowers 35—50 mm. long. *DIPLACUS* (p. 350)
 AA. Herbs, mostly not glutinous, mostly not so high; leaves opposite or all basal; flowers mostly smaller.
 B. Plant erect to diffuse; leaves opposite, not all in basal tuft, often longer, often not entire; flowers not on scape-like peduncles, longer than 2 mm., often yellow or blue.
 C. Calyx 5-angled to terete, clefts between its teeth not reaching the middle; anther-bearing stamens 4, antherless stamens 0; leaves often several-veined from the base. *MIMULUS* (p. 350)
 CC. Calyx terete, clefts between its teeth extending to the middle or beyond; anther-bearing stamens 2, antherless stamens 2.
 D. Leaves pinnately veined, 2.5—5 cm. long; corolla white or yellow, 8—12 mm. long; antherless stamens short, not forked. *GRATIOLA* (p. 352)
 DD. Leaves several-veined from the base, 1.2—2.5 cm. long; corolla red or purple, about 6 mm. long; antherless stamens long, forked.
ILYSANTHES (p. 352)

- BB. Plant floating or creeping; leaves alternate but in a basal tuft, 8—12 mm. long, entire; flowers solitary on scape-like peduncles, about 2 mm. long, not yellow nor blue; anther-bearing stamens 4.

LIMOSELLA (p. 352)

DIPLACUS

Shrubs; ours 6—18 dm. high, nearly glabrous but the young parts glutinous. Leaves opposite; in ours narrowly oblong to linear, entire to denticulate, 2.5—10 cm. long, glabrous above, pubescent beneath with branched hairs. Flowers large, 3.5—5 cm. (ours), yellow or orange or red, solitary in the leaf-axils, peduncled. Calyx tubular, 2.5 cm. long (ours), 5-toothed. Corolla tubular, 2-lipped; upper lip 2-lobed; lower lip 3-lobed. Anther-bearing stamens 4. Capsule linear-oblong, with woody tubercle at tip, boat-shaped when it splits. (Gk. $\text{dis}=2$, $\text{plakos}=a$ placenta; the splitting of the capsule shows 2 conspicuous placentae.) U.

D. glutinosus Nutt.

MIMULUS

MONKEY FLOWER

Herbs, annual or perennial. Leaves opposite. Flowers mostly showy, either solitary in the leaf-axils or else in terminal racemes by the reduction of the upper leaves to bracts. Calyx tubular, persistent, almost terete to 5-ribbed, 5-toothed, upper tooth usually largest. Corolla irregular to nearly regular; tube cylindric; limb 2-lipped; upper lip erect or reflexed, 2-lobed; lower lip spreading, 3-lobed. Stamens 4, 2 shorter. Stigma 2-lobed. Capsule obtuse, not exceeding the calyx. (Gk. *mimo*=an ape; from the grinning corolla.)

A. Flowers yellow.

B. Leaves with 3 or more veins from the base.

C. Stems leafy, not scapose, rarely only 1-flowered.

D. Corolla 25—50 mm. long; calyx shorter than the corolla, its lobes equal or unequal.

E. Plant not viscid-hairy.

F. Plants 15—60 cm. high, without rhizomes; stems more than 1-flowered.

G. Leaves oblong to orbicular; plant glabrous thruout or pubescent to puberulent in the inflorescence; capsule oblong; seeds oblong. W. C.

E. (*M. hirsutus*; *M. grandiflorus*.)

M. langsdorfii Donn.

GG. Leaves oblong-lanceolate; plant glabrous thruout; capsule obovate; seed obovate. W.

M. scouleri Hook.

FF. Plants 2—4 cm. high, with rhizomes; stems mostly 1-flowered. C.

M. alpinus Pip.

EE. Plant viscid-hairy, 10—20 cm. high, with rhizomes. W. E.

M. implexus Gr.

DD. Corolla 8—16 mm. long; calyx shorter than the corolla, its lobes unequal.

H. Stems stout, 4-angled, branching from the base. W. C. E.

M. nasutus Gr.

HH. Stems slender, terete, mostly simple. E.

M. microphyllus Benth.

DDD. Corolla 4—6 mm. long; calyx longer than the corolla, its lobes nearly equal. E.

M. breviflorus Pip.

CC. Stem leafless, scapose, 1-flowered. C. E. (*M. pilosellus*.)

M. primuloides Benth.

- BB. Leaves with only 1 vein from the base.
- I. Calyx 5-angled, 5-toothed.
- J. Corolla 20—25 mm. long.
- K. Plant not viscid; hairy lines inside the corolla extending to its base; seed ovate. W. *M. dentatus* Nutt.
- KK. Plant viscid; hairy lines inside the corolla not extending to its base; seed spherical. W. C. E.
M. moschatus Dougl. (Musk-flower)
- JJ. Corolla 4—20 mm. long.
- L. Plant villous with spreading white hairs, prostrate or spreading. E. (*M. jungermannioides*.) *M. floribundus* Dougl.
- LL. Plants glabrous or puberulent, not villous, erect (except *M. alsinoides*).
M. Calyx-teeth distinctly unequal, 2 larger; lower lip of corolla with bright crimson spot in center. W. C. E.
M. alsinoides Dougl.
- MM. Calyx-teeth equal or very nearly so; corolla without crimson spot.
- N. Leaves with wide petioles; corolla 10—20 mm. long.
- O. Calyx cylindric in fruit; capsule oblanccolate. E.
M. peduncularis Dougl.
- OO. Calyx distended in fruit; capsule oblong. E.
M. pulsiferae Gray
- NN. Leaves sessile but narrowed at base; corolla 6—8 mm. long. C.
E. (*M. suksdorfii*.)
M. rubellus Gray
- II. Calyx not angled, 5-cleft; corolla 6—8 mm. long, under lip usually with a pair of brown spots. E. *M. pilosus* Wats.
- AA. Flowers pink or red or purple.
- P. Corolla 5—10 mm. long; stigma 2-lipped.
- Q. Plant not viscid or merely viscid-puberulent; corolla 6—8 mm. long; some of the leaves wider than linear. (See NN.)
- QQ. Plant viscid-pubescent with spreading hairs; corolla 8—10 mm. long; leaves linear. C. E. (*Eunanus breweri*.)
M. breweri Rydb.
- PP. Corolla 14—20 mm. long; stigma funnellform.
- R. Leaves elliptic or merely the upper ones ovate, acute.
- S. Calyx-teeth subulate, about $\frac{1}{2}$ as long as the calyx-tube. E. (*Eunanus bigelovii*.)
M. bigelovii Gray
- SS. Calyx-teeth triangular, acute $\frac{1}{4}$ — $\frac{1}{3}$ as long as the calyx-tube. E. (*Eunanus tolmei*.) *M. nanus* H. & A.
- RR. Leaves ovate, acuminate; calyx-teeth triangular-subulate. E. (*Eunanus cusickii*.)
M. cusickii Pip.
- PPP. Corolla 22—50 mm. long; stigma either 2-lipped or funnellform.
- T. Perennial; calyx 16—30 mm. long; style glabrous.
- U. Upper leaves often connate; calyx 25—30 mm. long; corolla scarlet and yellow; stamens exserted. W. E.
M. cardinalis Dougl.
- UU. Leaves not connate; calyx 16—20 mm. long; corolla rose-red and purplish; stamens included. C. E.
M. lewisii Pursh
- TT. Annual; calyx 10—12 mm. long; style pubescent above; upper leaves often connate. U. E. (*Eunanus douglasii*.)
M. subuniflorus Pip.

GRATIOLA

HEDGE-HYSSOP

Herbs, annual (ours), erect or diffuse. Leaves opposite, entire or dentate. Flowers white or yellow, peduncled, solitary in the leaf-axils. Calyx 5-lobed; lobes narrow, slightly unequal. Corolla-tube cylindric; limb more or less 2-lipped; upper lip entire to 2-cleft; lower lip 3-lobed. Anther-bearing stamens 2; anther-sacs transverse, 2 other stamens mere antherless rudiments. Stigma slightly 2-lobed. Capsule loculidical and septicidal, ovoid or globose, 4-valved. Seeds longitudinally and transversely striate. (*L. gratia*=a favor, from supposed medicinal value.)

A. Peduncles 2-bracted under the calyx; sepals 6 mm. long, shorter than the corolla; capsule ovate, about equaling the calyx. W. C. E.

G. virginana L.

AA. Peduncles bractless; sepals 8—12 mm. long, equaling the corolla; capsule globose, much shorter than the calyx. W. C.

G. ebracteata Benth.

ILYSANTHES

FALSE PIMPERNEL

Herbs, annual or biennial, glabrous, slender, branching; ours 7.5—20 cm. high, in mud. Leaves opposite, mostly dentate, mostly sessile; in ours 3—7-veined from base, 12—25 mm. long. Flowers small, purplish or reddish, peduncled, solitary in the leaf-axils; peduncles not bracteolate. Calyx 5-lobed; lobes linear. Corolla irregular; tube somewhat expanded above; limb 2-lipped; upper lip 2-cleft, erect; lower lip larger, 3-lobed, spreading. Stamens 2, included; antherless filaments 2, 2-lobed, one lobe capitate and glandular, other lobe shorter and glabrous. Stigma slightly 2-lobed. Capsule ovoid or oblong, septicidal. Seeds wrinkled. (*Gk. ilys*=mud, *anthos*=flower; from the habitat.) W. C. E. (*I. gratioloides*.)

I. dubia Barnh.

LIMOSELLA

MUDWORT

Herb, annual or perennial, low, glabrous, succulent, floating or creeping on mud, tufted; stems filiform, rooting at nodes. Leaves entire, alternate but basal; in ours filiform-linear, or with slender petioles and oblong or linear-oblong blade. Flowers small, white or pink or purple; peduncles scape-like, 1-flowered, filiform. Calyx campanulate, 5-lobed. Corolla nearly regular, open-campanulate; tube short; limb 5-cleft. Stamens 4, hardly exerted. Ovary 2-celled at base, 1-celled above; stigma capitate. Capsule globose or oblong, becoming 1-celled. (*L. limus*=mud, *sella*=a seat; because it is a stemless mud plant.) W. E. (*L. tenuifolia*.) *L. aquatica* L.

DIGITALEAE (FOX-GLOVE TRIBE)—Herbs, annual or perennial, erect to creeping or almost acaulescent. Leaves opposite or alternate, scattered or nearly all basal, pinnately-veined or several-veined from the base, entire to divided, 0.4—25 cm. long (ours). Flowers solitary in the leaf-axils, or in terminal or axillary racemes or spikes. Calyx 4—5-toothed or -lobed. Corolla rotate or campanulate or salver-shaped or tubular, not swollen at base, often nearly regular, variously colored but not green nor yellow. Anther-bearing stamens 2 or 4; antherless ones 0. Capsule dehiscent. Seeds few to many.

A. Leaves 0.4—10 cm. long, often several-veined from the base, alternate or opposite; plant prostrate or erect or almost acaulescent, usually less than 3 dm. high; co-

rolla rotate or salverform or short-campanulate, 2—15 mm. long, often blue; calyx 4- or rarely 5-toothed.

B. Leaves chiefly scattered along the stem, at least the lower opposite, entire to toothed; spikes or racemes terminal or axillary; annual or perennial.

VERONICA (p. 353)

BB. Leaves chiefly basal, all alternate, toothed to divided; spikes or racemes terminal; perennial.

SYNTHYRIS (p. 354)

AA. Leaves 10—25 cm. long, pinnately veined, alternate; plant erect, 3—15 dm. high; corolla tubular or long-campanulate, 35—50 mm. long, not blue; calyx 5-toothed.

DIGITALIS (p. 354)

VERONICA

SPEEDWELL

Annual or perennial. Leaves mostly opposite, rarely whorled or alternate. Flowers small, white or pink or blue, solitary in the leaf-axils, or in terminal or axillary racemes or spikes. Calyx 4—5-parted. Corolla rotate; tube very short, limb deeply 4—5-lobed; lower lobe usually smallest. Stamens 2. Ovary 2-celled; stigma capitate. Capsules somewhat flattish, emarginate to 2-lobed, loculicidal. Seeds few to many, flat to cup-shaped. (Said to be in honor of St. Veronica.)

A. Flowers in the axillary racemes; bracts of the racemes small, not leaf-like; perennial.

B. Leaves linear to linear-lanceolate; capsule distinctly flat; seeds several. W. C. E.

V. scutellata L. (Marsh Speedwell)

BB. Leaves ovate to oblong-lanceolate; capsule turgid, orbicular or nearly so; seeds many.

C. Stem-leaves short-petioled, serrate. W. C. E.

V. americana Schw. (Brook-lime)

CC. Stem-leaves sessile or somewhat clasping, serrate or entire. E.

V. anagallis-aquatica L. (Water Speedwell)

AA. Flowers solitary in the axils of the upper leaves which are either foliage leaves or leaf-like bracts.

D. Perennial; most of the leaves opposite; inflorescence-leaves much reduced, the upper bract-like.

E. Lower leaves petioled, upper sessile; capsule wider than long.

F. Rachis and pedicels puberulent but not glandular-hairy; corolla 3—4 mm. wide, whitish or pale blue; leaves 7—15 mm. long. W. E.

V. serpyllifolia L. (Thyme-leaved Speedwell)

FF. Rachis and pedicels glandular-hairy; corolla 5—10 mm. wide, dark blue; leaves 10—25 mm. long. W. C. E. (*V. serpyllifolia humifusa*.)

V. humifusa Dicks.

EE. All the leaves sessile; capsule longer than wide.

G. Leaves longer than the internodes; corolla 6—10 mm. wide.

H. Stem glabrous; sepals lanceolate; corolla blue to violet, 8—10 mm. wide. W. C. E. *V. cusickii* Gray

HH. Stem pubescent above, glabrous below; sepals oblong to ovate; corolla white with purplish throat, 6—7 mm. wide. C.

V. allenii Greenm.

GG. Leaves shorter than the internodes; corolla 5—6 mm. wide. W. C. E. (*V. wormskioldii*; *V. alpina unalaskensis*.)

V. scutellata L. (Marsh Speedwell)

DD. Annual; most of the leaves alternate; inflorescence-leaves normal or merely smaller.

I. Flowers in the axils of reduced leaves; pedicels short; seed flat.

- J. Plant glabrous or merely glandular-puberulent; lowest leaves oval-oblong, toothed; petals white; capsules emarginate. W. E.
V. peregrina L. (Neck-weed)
- JJ. Plant pubescent; lowest leaves ovate, crenate; petals blue; capsule obcordate. W. C. E. *V. arvensis* L. (Wall Speedwell)
- II. Flowers in the axils of ordinary leaves; pedicels long; seed cup-shaped; petals blue; plant pubescent. E. *V. tournefortii* Gmel.

SYNTHYRIS

Perennial; stems simple. Leaves chiefly basal. Flowers rather small, white or pink or blue or purple, in terminal spikes or racemes. Calyx 4-parted. Corolla oblong to short-campanulate, 4-cleft, more or less irregular, rarely none. Stamens 2, rarely 4, exerted. Stigma capitate. Capsule flattish, obtuse or emarginate. Seeds saucer-shaped, orbicular or oval, smooth. (Gk. syn—together, thyris—a little door; referring to the closed valves of the pod.)

- A. Leaves reniform-orbicular; flowers in racemes.
 B. Petals entire.
 C. Scape naked except for the floral bracts, usually shorter than the leaves; calyx-lobes ovate. W. C. *S. rotundifolia* Gray
- CC. Scape with some scattered and alternate or opposite leaves, exceeding the leaves; calyx-lobes lanceolate. E. (*S. major*.)
S. reniformis Benth.
- BB. Petals laciniately incised. W.
S. schizantha Pip.
- AA. Leaves not reniform-orbicular; flowers in spikes.
 D. Leaves crenulate; corolla none. E.
S. rubra Benth.
- DD. Leaves pinnatifid; corolla whitish, nearly twice as long as the calyx.
 E. Plant slightly white-woolly. E.
S. pinnatifida Wats.
- EE. Plant densely white-woolly. W.
S. pinnatifida lanuginosa Pip.

DIGITALIS

FOX-GLOVE

Tall, biennial or perennial (ours). Leaves alternate, in ours 15—25 cm. long, dentate, ovate to lanceolate. Flowers showy, white or red or purple, often spotted, in racemes; racemes long, terminal, usually 1-sided, 3.5—5 cm. long (ours). Calyx 5-parted. Corolla 3.5—5 cm. long (ours); tube contracted above the ovary and then rather abruptly expanded, longer than the limb; limb 4—5-lobed, slightly 2-lipped, upper lip widely emarginate or 2-cleft; lower lip 3-lobed, middle lobe largest. Stamens 4, 2 shorter. Stigma 2-lobed. Capsule ovoid, septicidal. Seeds many, rugose. (*L. digitalis*=belonging to the finger; the corolla suggests a glove-finger.) W.

D. purpurea L.

RHINANTHEAE (PAINT-BRUSH TRIBE)—Herbs, annual or biennial or perennial, erect. Leaves alternate or opposite or whorled, pinnately veined or several-veined from the base, entire to dissected, 1.2—30 cm. long (ours). Flowers either solitary in the leaf-axils or else in terminal racemes or spikes or fascicles. Calyx 1—5-toothed or -lobed. Corolla tubular, not swollen at base, distinctly irregular, variously col-

ored but not blue nor green. Either anther-bearing stamens 4 and antherless ones 0, or else anther-bearing stamens 2 and antherless ones 2 or 0. Capsule loculicidal. Seeds few or many.

A. Leaves alternate.

B. Leaves entire to pinnately or palmately parted into 3—11 long lobes, sometimes the lobes again lobed; upper lip of the corolla not elephant-trunk-like.

C. Capsule few-seeded; calyx cleft down 1 side and apparently of 2 sepals; lips of the corolla nearly equal. ADENOSTEGIA (p. 358)

CC. Capsule many-seeded; calyx cleft down 1 or 2 or 4 sides and apparently of 4 sepals or rarely of 2 sepals.

D. Lips of the corolla nearly equal; calyx 2- or 4-toothed.

ORTHOCARPUS (p. 357)

DD. Lips of the corolla unequal; calyx 4-toothed. CASTILLEJA (p. 355)

BB. Leaves either serrate and the upper lip of the corolla prolonged into an elephant-trunk-like projection, or else leaves pinnately more than 15-lobed or -parted into rather wide short lobes. PEDICULARIS (p. 359)

AA. Leaves opposite or whorled.

E. Leaves entire or with a few bristle-pointed teeth at base; corolla 8—12 mm. long; seeds 2—4. MELAMPYRUM (p. 359)

EE. Leaves not entire, serrate or crenately dentate to pinnately divided; corolla 12—40 mm. long; seeds several or many.

F. Stem without black lines near the top; leaves pinnately veined, either some of them pinnately lobed or else the upper lip of the corolla long and elephant-trunk-like; corolla white or red or purple or yellow. PEDICULARIS (p. 359)

FF. Stem with fine black lines near the top; leaves merely crenate-dentate; upper lip of the corolla not elephant-trunk-like; corolla yellow. RHINANTHUS (p. 360)

CASTILLEJA (Castilleia) INDIAN PAINT-BRUSH

Annual or perennial, parasitic on the roots of other plants. Leaves alternate, entire to pinnatifid. Flowers in spikes; spikes terminal, leafy-bracted; bracts often brightly colored, sometimes exceeding the flowers. Calyx tubular, laterally flattened, cleft on the upper or lower side or both; the 2 lobes entire to 2-toothed. Corolla very irregular, white or red or purple or yellow; tube not exceeding the calyx; limb 2-lipped; upper lip (galea) arched, elongated, concave or keeled, laterally flattened, entire, enclosing the stamens; lower lip short, 3-toothed, 3-keeled or somewhat saccate below. Stamens 4, 2 shorter; anther-sacs unequal, the outer attached by its middle, the inner hanging by its end. Capsule ovoid or oblong. Seeds many, reticulate. (Honor of D. Castillejo, a Spanish botanist.)

A. Upper bracts of the inflorescence red or purple. GROUP 1 (p. 355)

AA. Upper bracts of the inflorescence green or whitish or yellowish. GROUP 2 (p. 357)

GROUP 1

A. Bracts of the inflorescence entire.

B. Plant villous-pubescent thruout.

C. Annual; bracts linear; corolla 12—20 mm. long. E. (C. minor for our region.) C. exilis Nels.

CC. Perennial; bracts oblong to broadly cuneate; corolla 25—30 mm. long. E. C. elmeri Fer.

BB. Plant glabrous except the inflorescence; bracts scarlet. W. C. E. (C. dixonii.) C. miniata Dougl.

- AA. Bracts of the inflorescence somewhat lobed or dissected.
- D. Calyx more deeply cleft in front than behind; leaves often all entire.
- E. Calyx 16—20 mm. long; plant 2—3 dm. high; pubescent to base; corolla 2.5—3 cm. long. (See CC.)
- EE. Calyx 20—30 mm. long; plant 5—10 dm. high, glabrous below; corolla 4—5 cm. long. E. *C. linearifolia* Benth.
- DD. Calyx more deeply cleft behind than in front. E. *C. covilleana* Hend.
- DDD. Calyx cleft to about the same depth behind as in front.
- F. Corolla-tube about 3 times as long as its upper lip. E. *C. rubida* Pip.
- FF. Corolla-tube 1—2 times as long as its upper lip.
- G. Stems glabrous below; bracts crimson or white. W. C. E. (*C. oreopola subintegra*.) *C. oreopola* Greenm.
- GG. Stems not glabrous below; bracts scarlet.
- H. Plants ashy-pubescent. E. *C. pruinosa* Fer.
- HH. Plant not ashy-pubescent.
- I. Plant densely glandular; leaves lanceolate to obovate. E. *C. applegatei* Fer.
- II. Plant not glandular or only sparingly so.
- J. Leaves all entire.
- K. Stems 3—4 dm. high; leaves oblong-linear, 5—10 cm. long. E. *C. pinetorum* Fer.
- KK. Stem 2—3 dm. high; leaves lanceolate.
- L. Leaves 2—4 cm. long; bracts entire or merely few-toothed near the apex. C. *C. crispula* Pip.
- LL. Leaves 5—15 cm. long; bracts cleft into linear lobes. (See NN.)
- JJ. Leaves or some of them deeply lobed.
- M. Middle lobe of bracts wide and rounded; halves of the calyx each with 2 very shallow lobes or merely emarginate or entire. E. (*C. pilosa*; *C. lutea*.) *C. camporum* How.
- MM. All segments of the bracts linear; halves of the calyx each with 2 lanceolate or ovate-lanceolate lobes.
- N. Leaves cleft.
- O. Stem densely pilose.
- P. Stem 1—3 dm. high; leaves slender, spreading. E. *C. angustifolia* Don.
- PP. Stem 4—5 dm. high; leaves short, not spreading. E. *C. angustifolia hispida* Fer.
- OO. Stem sparingly pilose.
- Q. Leaves lanceolate to oblong-lanceolate, 2—5 cm. long. W. C. E. (*C. bradburii*.) *C. angustifolia bradburii* Fer.
- QQ. Leaves ovate-oblong to obovate, 1—2.5 cm. long. W. *C. angustifolia abbreviata* Fer.
- NN. Leaves all entire. E. *C. angustifolia whitedii* Pip.
- FFF. Corolla-tube much shorter than its upper lip.
- R. Stem 1—2 dm. high, from stout caudices; bracts with linear lobes. C. *C. rupicola* Pip.
- RR. Stem 3—6 dm. high, from slender rhizomes; bracts with short lobes. C. *C. suksdorfii* Gray

GROUP 2

- A. Bracts of the inflorescence lobed or cleft.
- B. Calyx 10—20 mm. long.
- C. Plant ashy-pubescent or -puberulent; corolla 10—20 mm. long.
- D. Inflorescence more or less pilose. E. (*C. pecten.*)
C. fasciculata Nels.
- DD. Inflorescence not pilose.
- E. Upper leaves lobed; inflorescence not glandular; upper lip of the corolla twice as long as the lower. E.
C. pallescens Greenm.
- EE. All the leaves often entire; inflorescence somewhat glandular; upper lip of the corolla 4 times as long as the lower. E.
C. rustica Pip.
- CC. Plant glabrous or pubescent or pilose, but not ashy.
- F. Calyx 2-cleft, the lobes 2-toothed or -cleft.
- G. Upper lip of the corolla more than twice as long as its tube.
- H. Pubescence soft, pilose. W.
C. laevisecta Greenm.
- HH. Pubescence harsh, stiff. E.
C. lutescens Rydb.
- GG. Upper lip of the corolla less than twice as long as its tube. (See JJ of Group 1.)
- FF. Calyx cleft into 4 almost equal lobes; corolla 12—15 mm. long. E.
C. longispica Nels.
- BB. Calyx 25—40 mm. long.
- I. Upper lip of the corolla nearly as long as the corolla-tube; corolla 25—50 mm. long. (See JJ of Group 1.)
- II. Upper lip of the corolla about $\frac{1}{4}$ as long as the corolla-tube; corolla about 25 mm. long. E. *C. pilifera* Nels.
- AA. Bracts of the inflorescence all entire. E.
C. cusickii Greenm.

ORTHOCARPUS

OWL-CLOVER

Annual or perennial, 6 dm. or less high (ours). Leaves alternate, entire to dissected. Flowers solitary in the axils, or the subtending leaves reduced making a terminal bracted spike; bracts often colored. Calyx tubular or tubular-campanulate, 4-cleft, sometimes colored. Corolla very irregular, white or red or purple or yellow; tube slender or short; limb 2-lipped; upper lip from slightly longer to slightly shorter than the lower; lower lip 3-lobed, 1—3-saccate. Stamens 4, 2 shorter; anther cells unlike, sometimes only 1, sometimes none, the outer attached by its middle, the inner hanging by its end. Capsule oblong. Seeds many, reticulate. (Gk. *orthos*=erect, *carpos*=fruit.)

- A. Leaves entire or merely 3-lobed or -segmented.
- B. Corolla white; lower lip purple-spotted, with 3 conspicuous teeth or lobes; leaves 5—8 cm. long. W. *O. attenuatus* Gray
- BB. Corolla yellow or rose or purple; lower lip entire or with 3 very short teeth.
- C. Corolla white or yellow; leaves 2.5—5 cm. long.
- D. Plant pubescent or hirsute; stem usually simple; corolla pubescent outside.
- E. Calyx-teeth acute; corolla yellow, its lower lip about as long as the upper. E. *O. luteus* Nutt.
- EE. Calyx-teeth subulate; corolla white or cream-colored, its lower lip much longer than the upper. E. *O. hispidus* Benth.

- DD. Plant merely puberulent; stem usually with spreading branches above; corolla glabrous. *E. C. tolmiei* H. & A.
- CC. Corolla purple or rose-colored.
- F. Bracts of the inflorescence not colored, all 3-cleft. W. C. E.
O. hracteosus Benth.
- FF. Bracts of the inflorescence red or purple, entire or with 2 smaller lateral lobes.
- G. Leaves 5—8 cm. long, entire or 3-segmented; bracts purple, ciliate at base; calyx 8—12 mm. long; corolla 25 mm. long; capsule ovate. U.
O. cuspidatus Gr.
- GG. Leaves 2.5—5 cm. long, all entire; bracts dull-red, glabrous; calyx 4 mm. long; corolla 8—16 mm. long; capsule obovoid. W. C.
O. imbricatus Torr.
- AA. Leaves or some of them more than 3-lobed or -segmented.
- H. Corolla 4—6 mm. long, purplish. W.
O. pusillus Benth. (Red Ant-weed)
- HH. Corolla 10—16 mm. long.
- I. Corolla purplish; bracts very different from the leaves.
- J. Tip of upper lip of corolla hooked, puberulent; bracts obtuse. E.
O. tenuifolius Benth.
- JJ. Tip of upper lip of corolla straight, not hooked, glandular-pubescent; bracts acute. E. *O. barbatus* Cot.
- II. Corolla white or yellowish; bracts not markedly different from the leaves.
- K. Perennial; lower lip of corolla 1-saccate; bracts somewhat whitish or yellowish at the tip. C. *O. pilosus* Wats.
- KK. Annual; lower lip of corolla 3-saccate; bracts not different in color from the leaves. E. *O. lacerus* Benth.
- HHH. Corolla 20—28 mm. long.
- L. Bracts with white or yellow or crimson or purple tips.
- M. Bracts white or yellow at least at tips; corolla dull-white or purplish tipped, its upper lip glabrous; filaments glabrous. W.
O. castilleoides Benth.
- MM. Bracts crimson or purple at least at tips; corolla crimson or purple, its upper lip bearded on the back; filaments pubescent. W.
O. purpurascens Benth. (Purple Owl-clover)
- LL. Bracts with tips uncolored.
- N. Stem much branched; calyx 10—12 mm. long; its teeth lanceolate, about $\frac{1}{3}$ as long as the tube; corolla yellow; anthers 1-celled. W.
O. erianthera Benth.
- NN. Stem simple or with a few branches above; calyx 4 mm. long; its teeth subulate about as long as the tube; corolla cream-color or pale-rose; anthers 2-celled. U. *C. lithospermoides* Benth.

ADENOSTEGIA

Annual, branching. Leaves alternate, narrow, entire to dissected. Flowers inconspicuous, in terminal leafy-bracted spikes or fascicles. Calyx spathe-like; sepals apparently 1—2 (2 in ours). Corolla purple or yellow, slightly dilated upward, 2-lipped; lips short, rarely unequal in length; upper lip narrow; lower lip entire to 3-crenulate, round. Stamens 4, 2 shorter, or else 2 of these antherless or even not present at all; anther-cells either pilose-ciliate or with the base and apex minutely bearded, unlike, outer attached by its middle, inner hanging by its end. Capsule flattish. Seeds few. (Gk. adenos=a gland, stegia=a sheath; floral leaves and bracts are tipped with glands.)

- A. Plant not viscid-glandular; upper calyx-lobe 2-toothed or emarginate.
- B. Leaves mostly entire; corolla purplish; anther-bearing stamens 2, rudimentary stamens 2; anthers 1-celled; capsule 8-seeded. C. E.
 - A. *capitata* Gr.
- BB. Leaves mostly dissected; corolla yellow; anther-bearing stamens 4; anthers 2-celled; capsule 20-seeded. E.
 - A. *ramosa* Gr.
- AA. Plant viscid-glandular; upper calyx-lobe acuminate; leaves mostly entire; corolla purplish; anther-bearing stamens 2, antherless stamens 2; anthers 2-celled. U.
 - A. *viscida* How.

MELAMPYRUM

COW WHEAT

Annual, branching; ours pubescent, 15—45 cm. high. Leaves opposite; in ours lanceolate to linear-lanceolate, 2.5—6.3 cm. long. Flowers small, solitary in the upper leaf-axils or in terminal spikes. Calyx 4-toothed, 2 upper teeth longer. Corolla 2-lipped, tube narrow, gradually enlarged above; in ours 8—12 mm. long, white or whitish with yellow lower lip; upper lip compressed, obtuse or emarginate; lower lip spreading or ascending, 3-toothed. Stamens 4. Capsule flat, oblique. Seeds 2—4, smooth. (Gk. *melas*=black, *pyros*=wheat; referring to the color of the seed of some species.) E.

M. *linare* Lam.

PEDICULARIS

LOUSEWORT

Annual or biennial or perennial. Leaves alternate or opposite or whorled. Flowers white or red or purple or yellow, in terminal spikes or racemes. Calyx tubular, cleft on lower side and sometimes also on upper, or 2—5-toothed. Corolla strongly 2-lipped; tube cylindric; upper lip laterally compressed; lower lip erect or ascending, 3-lobed; lobes of lower lip spreading or reflexed, middle one smallest. Stamens 4, 2 shorter. Capsule compressed, oblique or curved, beaked. Seeds many, reticulate or pitted or striate or ribbed. (L. *pediculus*=a louse; it was thought these plants caused lice in sheep.)

- A. Stem-leaves alternate or opposite.
- B. Leaves doubly crenulate; corolla whitish or yellowish. W. C. E.
 - P. *racemosa* Dougl. (Elephant-trunk)
- BB. Leaves or some of them pinnately parted.
- C. Corolla whitish or yellowish.
- D. Radical leaves none. U.
 - P. *howellii* Gray
- DD. Radical leaves present.
- E. Leaf-lobes linear; calyx 8—10 mm. long; corolla-beak slender, inrolled.
 - C. E. P. *contorta* Benth. (Elephant-trunk)
- EE. Leaf-lobes lanceolate; calyx about 18 mm. long; corolla-beak wide, hood-like. W. C. E.
 - P. *bracteosa* Benth.
- CC. Corolla scarlet or purple.
- F. Corolla beaked.
- G. Stems leafy; corolla-beak long, thread-like. W. C. E. (*P. groenlandica surrecta*.) I. *groenlandica* Retz (Butterfly-tongue)
- GG. Stems scapose or with 1 pair of leaves; corolla-beak short, conic. C. E.
 - P. *ornithorhyncha* Benth. (Bird-beak)
- FF. Corolla beakless.

- H. Plant glabrous; stems branching; calyx 2-cleft; corolla purplish, 12 mm. long. W. C. *P. parviflora* Sm.
- HH. Plant pubescent or glabrate; stems simple; calyx 5-toothed; corolla scarlet, 25—37 mm. long. U. C.
P. densiflora Benth. (Scarlet Lousewort)
- AA. Stem-leaves in whorls or nearly so. W.
P. menziesii Benth.

RHINANTHUS

YELLOW-RATTLE

Annual, erect, 3—6 dm. high (ours). Leaves opposite; in ours lanceolate, 2.5—5 cm. long, sessile. Flowers yellow (ours) or blue or variegated, 12—18 mm. long (ours), solitary in the upper leaf-axils or in terminal secund leafy-bracted spikes. Calyx flattened, 4-toothed, much inflated, membranous and veiny in fruit. Corolla very irregular or 2-lipped; upper lip compressed, arched, minutely 2-toothed below the entire apex; lower lip shorter, 3-lobed, its lobes spreading. Stamens 4, 2 shorter; anthers pilose. Capsule orbicular, flat. Seeds several, nearly orbicular, winged. (Gk. *rhin*=a snout, *anthos*=a flower; referring to the compressed corolla-wings.) W. C. E.

R. crus-galli L.

OROBANCHACEAE

Broom-rape Family

Herbs, erect, low, *root-parasites*, white or yellow or brown or purple, *without green*; stem simple. Leaves scale-like, alternate, appressed in most. Flowers perfect, irregular, either sessile in terminal bracted spikes or racemes, or else solitary and peduncled in the axils of the scales. Calyx either 4—5-toothed to -parted, or else deeply split on 1 or 2 sides and the lobes entire or toothed. *Corolla* sympetalous, somewhat oblique, 2-lipped, 5-lobed. *Stamens* 4, 2 shorter, on the corolla-tube, alternate with corolla-lobes; rudiment of 5th stamen sometimes present; filaments slender. Ovary-superior, 1-celled; placentae 4, parietal, sometimes nearer each other in pairs; *style slender*, stigma disk-like, 2- or 4-lobed. Capsule 2-valved. Seeds many, reticulate or wrinkled or striate.

A. Plant glandular-pubescent; scale-leaves often scattered; inflorescence often not cone-like; upper lip of corolla 2-lobed; anther-sacs separate below, their bases mucronate.

B. Peduncles 2.5—20 cm. long, naked.

THALESIA (p. 360)

BB. Peduncles 0—2 cm. long, often with bracteoles at base of calyx or farther down.

OROBANCHE (p. 361)

AA. Plant glabrous; scale-leaves densely crowded; inflorescence cone-like; upper lip of corolla entire; anther-sacs closely parallel, their bases blunt. BOSCHNIKIA (p. 361)

THALESIA (Aphyllon)

CANCER-ROOT

Glandular or viscid-pubescent. Leaves scattered. Flowers white or violet or yellowish, on long bractless scape-like peduncles. Calyx campanulate or hemispheric, nearly equally 5-cleft; lobes acute or acuminate. Corolla long, curved, slightly 2-lipped; upper lip 2-lobed; lower lip 3-lobed; all 5 lobes nearly equal. Stamens included; anther-sacs mucronate at base. Ovary ovoid; style deciduous. (Honor of the Greek philosopher Thales.)

A. Flowers 1—4; calyx-lobes subulate, acuminate, longer than the tube. W. C. E.
(*T. purpurea*; *T. sidi*.) *T. uniflora* Brit.

AA. Flowers 3—20; calyx-lobes triangular, acute, shorter than the tube. W. C. E.
T. fasciculata Brit.

BOSCHNIAKIA

Brown or reddish, glabrous, parasitic on Ericaceae. Leaves densely crowded. Flowers sessile or short-pedicelled, many, in a dense scaly-bracted terminal cone-like spike. Calyx short, cup-like, shorter at the back, with 3 teeth in front. Corolla swollen at base on 1 side; upper lip entire; lower lip 3-lobed or-toothed. Stamens about equaling the corolla; anther-sacs blunt at base. (Honor of some Russian, a Mr. Boschniak.)

A. Calyx with 2 hair-like bracteoles at base; calyx-teeth subulate; corolla-lips nearly equal; placentae 4. W. **B. strobilacea** Gray

AA. Calyx without bracteoles; calyx-teeth triangular, blunt; lower corolla-lip $\frac{1}{2}$ as long as the upper; placentae 2. W.

B. hookeri Walp.

OROBANCHE

BROOM-RAPE

Glandular-pubescent, white or yellowish or reddish or violet. Leaves scattered. Flowers in spikes or racemes. Calyx in ours unequally 5-toothed. Corolla strongly 2-lipped; upper lip emarginate or 2-lobed; lower lip 3-lobed. Stamens included; anther-sacs usually mucronate at base. Style usually persistent until opening of capsule. (Gk. orobos—a vetch, agchone—a strangler; thought injurious to vetches.)

A. Calyx-lobes plainly longer than the tube.

B. Pedicels 5—16 mm. long; stem simple or branched.

C. Stem 5—10 cm. high; anthers woolly. (*Myzorrhiza corymbosa*.) W. E.
O. comosa Hook.

CC. Stem 20—30 cm. high; anthers glabrous or slightly hairy. E.

O. californica C. & S.

BB. Pedicels 0—3 mm. long; stem simple. E.

O. ludoviciana Nutt.

AA. Calyx-lobes equaling or shorter than the tubes; stem branched above; flower nearly sessile. E.

O. pinorum Gey.

PINGUICULACEAE (Lentibulariaceae) Bladder-wort Family

Herbs, in water or on damp soil. Leaves either basal and tufted and entire, or else dissected or scale-like and on elongated stems. Flowers solitary on scapes, or else racemose on leafless axes of inflorescence, perfect; pedicels bracteolate. Calyx 2—5-parted. *Corolla* spurred at base, 2-lipped; upper lip usually erect, concave on the sides, plicate, entire or 2-lobed; lower lip larger, spreading or reflexed, 3-lobed, with a palate. *Stamens* 2. *Ovary* superior, ovoid or globose, 1-celled; *style* short or none; stigma 2-lobed. *Fruit* a capsule. *Seeds* many.

A. Terrestrial plants; leaves entire; flowers purple-violet. **PINGUICULA** (p. 362)

AA. Aquatic or marsh plants; leaves dissected or apparently none; flowers yellow.

UTRICULARIA (p. 361)

UTRICULARIA

BLADDER-WORT

Free-floating or mud-anchoring. Leaves finely-divided in nearly all, sometimes apparently none, bladder-bearing in most water-species, with a few mud-covered bladders or none in mud-species. Flowers yellow (ours), elevated above the water, racemose, or solitary on slender scapes or scape-like stems, pedicels 2-bracteolate. Calyx deeply 2-lobed. Upper lip of corolla usually entire; throat usually bearded.

A. Leaf-segments terete, their margins entire.

- B. Leaves 12—25 mm. long, 2—3 pinnately segmented, very bladdery; bladders 3—4 mm. long; corolla 12—15 mm. wide. W. C.
U. vulgaris L.
- BB. Leaves 4—8 mm. long, several times forked, with few or no bladders; bladders 1—2 mm. long; corolla 4—8 mm. wide.
- C. Corolla-spur short, obtuse. W. C.
U. minor L.
- CC. Corolla-spur conic, acute. C.
U. occidentalis Gray
- AA. Leaf-segments flat, their margins minutely bristle-toothed; leaves 6—12 mm. long, repeatedly forked; bladders nearly always on leafless branches. C. E.
U. intermedia Hayne

PINGUICULA

BUTTER-WORT

Acaulescent. Leaves all basal, tufted, entire, their upper side covered with a sticky substance to which insects adhere and are captured by the inrolling of the sensitive leaf-margins, in ours ovate to lanceolate, obtuse, 2.5—5 cm. long. Flowers solitary on naked scapes. Calyx 4—5-parted or 2-lipped; upper lip 2-parted; lower lip 3-parted. Corolla in ours violet-purple, 6—8 mm. wide; upper lip 2-cleft. W. C. E.

P. vulgaris L.

PLANTAGINACEAE

Plantain Family

Herbs, annual or biennial or perennial, *acaulescent* (ours), rarely stoloniferous. *Leaves basal* (ours) or alternate or opposite. *Flowers small*, perfect or polygamous or monoicous, solitary (not ours) or in spikes or heads; *clusters* terminal, bracted, *on scapes*. *Calyx 4-parted*, persistent; segments imbricated. *Corolla* scarious or membranous, mostly marcescent, *4-lobed*. Stamens 2 or 4, on the corolla; anthers versatile. Ovary sessile, superior, 1—2-celled or falsely 3—4-celled; style 1, filiform. Fruit a capsule and opening by a cap-like lid (ours), or else a 1-seeded nutlet. Seeds 1—several.

PLANTAGO

PLAINTAIN

Flowers greenish or purplish. Calyx-segments equal or 2 of them larger. Corolla salverform; tube cylindric or constricted at the throat; limb 4-lobed, spreading in flowering, in fruit erect to reflexed. Seeds 2 to many. (The Latin name.)

A. Leaves ovate. W. C. E. (*P. asiatica*.)

P. major L. (Common Plantain)

AA. Leaves lanceolate.

B. Seeds 1—2, flat or concave on the face.

C. Scape glabrous or slightly hairy above. W. C. E.

P. lanceolata L. (English Plantain)

CC. Scape densely woolly above. W.

P. macrocarpa C. & S.

BB. Seeds 4—5, plump, neither flat nor concave on the face. E.

P. eriopoda Torr.

AAA. Leaves linear.

D. Capsule 2-seeded.

E. Leaves fleshy; seashore plant. W.

P. maritima L. (Seaside Plantain)

EE. Leaves not fleshy; not particularly seashore plants.

F. Bracts $\frac{1}{4}$ — $1\frac{1}{4}$ as long as the calyx, not aristate.

- G. Scape densely woolly; bracts about as long as the calyx. W. C. E.
P. purshii R. & S.
- GG. Scape glabrous to pubescent; bracts about $1/3$ as long as the calyx. U.
P. tetrantha Mor.
- FF. Bracts 2—8 times as long as the calyx, aristate.
 H. Spikes dense; plant dark green; bracts 5—10 times as long as the calyx.
 W. *P. aristata* Michx.
- HH. Spike interrupted; plant light green; bracts about twice as long as the calyx. E. *P. spinulosa* Dcn.
- DD. Capsule 4-seeded.
 I. Plant usually glabrous; leaves linear; corolla-lobes remaining open in the capsule; spike dense; capsule 3—4 mm. long. W.
P. bigelovii Gray
- II. Plant ashy-puberulent; leaves linear-spatulate; corolla-lobes closing over the capsule; spike not dense; capsule 2 mm. long. C. E.
P. elongata Pursh

RUBIACEAE

Madder Family

Herbs (ours) or shrubs or trees, annual or perennial. *Leaves* simple, *opposite* or *whorled*, 1—5-veined from the base (ours); stipules present or none. *Flowers* perfect (ours) or dioicous, often of 2 or 3 kinds (not ours), regular. *Calyx* 4-toothed, or limbless and thus apparently none. *Corolla* funnelform or club-shaped (not ours) or campanulate or rotate, 4(ours)—5-lobed, often pubescent inside. *Stamens* as many as corolla-lobes and alternate with them, on the corolla. *Ovary inferior*, 1—10-celled (ours 2); styles 1—2, short or elongated, simple or lobed. *Fruit* a capsule or berry or drupe; in ours 2-lobed to -parted. *Seeds* 1—many.

A. Leaves opposite; stipules small, scarious.

KELLOGGIA (p. 363)

AA. Leaves whorled or occasionally some of them opposite; stipules none.

GALIUM (p. 363)

KELLOGGIA

Ours perennial, 1—3 dm. high. Leaves opposite; in ours lanceolate, sessile, entire; stipules present, small, scarious. Flowers in loose cymose panicles, usually in 4's, small; in ours white or pinkish. Calyx obovoid, somewhat flattened laterally, toothed, subulate, persistent. Corolla funnelform; lobes naked. Style 1, filiform, exserted; stigmas 2. Fruit dry, coriaceous, when ripe separating into 2 closed carpels, covered with hooked hairs. Seeds 2. W. C. E. (Honor of A. Kellogg, an American botanist.) W. C. E.
K. galioides Torr.

GALIUM

BED-STRAW

Stem slender, 4-angled. Leaves in whorls of 4—8 or rarely some of them opposite. Flowers small; green or white or yellow or purple, mostly in axillary or terminal cymes or panicles; pedicels usually jointed at the calyx. Calyx-limb none or minutely toothed. Corolla rotate. Styles 2, short; stigma capitate. Fruit of 2 somewhat spherical halves, dry or fleshy, smooth or rough or hairy or bristly; separating into 2 indehiscent carpels. (L. gala=milk; some species were used to curdle milk.)

A. Leaves 2—4 in a whorl but never all in 2's, 1—5-veined from the base.

B. Leaves 3—5-veined from the base.

C. Fruit hispid with hooked hairs; leaves 12—37 mm. long; leaf-margin ciliate; flowers yellowish-green.

- D. Leaves oblong-ovate, acutish. C.
G. kamtschaticum Stell. (Northern Wild Licorice)
- DD. Leaves obovate to orbicular, obtuse. W. C. (*G. oreganum*.)
G. kamtschaticum oreganum Pip.
- CC. Fruit either smooth or hispid with hooked hairs; leaves 25—63 mm. long; leaf-margin ciliate or not; flowers clear white. W. C. E.
G. boreale L. (Northern Bed-straw)
- CCC. Fruit hispid with straight hairs; leaves 8—16 mm. long; leaf-margin not ciliate; flowers yellowish-green. E. (*G. multiflorum watsoni*; *G. multiflorum puberulum*.)
G. multiflorum Kell.
- BB. Leaves 1-veined from the base.
- E. Annual; leaves 2—4 in a whorl, if 4 then 2 of them only $\frac{1}{4}$ — $\frac{3}{4}$ as long as the other 2; fruit minutely hispid with hooked bristles. U. C. E.
G. bifolium Wats. (Twin-leaved Bed-straw)
- EE. Perennial; leaves 4 in a whorl, all 4 about equal; fruit smooth.
- F. Leaves flat, linear or oblong or wider, not densely crowded; plant 3—12 dm. high, diffuse or climbing.
- G. Plant 7—12 dm. high; leaves obtuse, often mucronate. U.
G. nuttallii Gray
- GG. Plant 3—6 dm. high; leaves acute, not mucronate. U. C.
G. bolanderi Gray
- FF. Leaves awl-shaped, angular, densely crowded; plant 0.5—2.5 cm. high, depressed, caespitose. U. *G. andrewsii* Gray
- AA. Leaves 4—6 in a whorl but never all in 4's, 1-veined from the base; perennial.
- H. Leaves acute to rounded, 4—6 in a whorl; fruit smooth.
- I. Flowers 1—3 on peduncles which are solitary in the leaf-axils. W. C. E. (*G. trifidum subbiflorum*; *G. trifidum pacificum*; *S. arcuatum*.)
G. trifidum L. (Small Bed-straw)
- II. Flowers in cymes, numerous. W.
G. cymosum Weig.
- HH. Leaves acuminate or cuspidate, 6 in a whorl; fruit minutely or plainly stiff-hairy.
- J. Fruit covered with hooked hairs; leaves 1—2.5 cm. long. W. C. E.
G. triflorum Michx. (Fragrant Bed-straw)
- JJ. Fruit rough or minutely hairy but not with hooked hairs; leaves 2.5—5 cm. long. E.
G. asperrimum Gray
- AAA. Leaves 6—8 in a whorl but never all in 6's, 1-veined from the base; fruit covered with hooked bristles; annual.
- K. Stems erect or ascending; fruit 2—3 mm. wide; leaves 1—2.5 cm. long. E. (*G. spurium*.)
G. vaillantii DC.
- KK. Stems reclining; fruit 4—6 mm. wide; leaves 2.5—7 cm. long. W. E.
G. aparine L. (Cleavers)

CAPRIFOLIACEAE

Honeysuckle Family

Herbs or shrubs or trees, perennial, vines to erect. Leaves opposite, simple or pinnately odd-compound, pinnately or palmately veined; stipules present or none. Flowers perfect, regular or irregular, in cymes or pairs or solitary in the leaf-axils. Calyx 5-toothed or -lobed. Corolla rotate to tubular, often gibbous at base, 5-lobed, sometimes 2-lipped. Stamens 4—5, on the corolla-tube, alternate with the lobes; anthers versatile. Ovary inferior, 1—6-celled; style slender; stigma capitate or 2—5-lobed; cells 1- to several-ovuled. Fruit a berry or drupe or capsule.

- A. Leaves pinnately compound; anthers opening on the outer side; tall shrubs or trees; fruit berry-like, black or red or yellow, 3—5-seeded. SAMBUCUS (p. 365)
- AA. Leaves simple; anthers opening on the inner side.
- B. Leaves palmately 3—5-veined; fruit drupe-like, red or black, 1-seeded; tall shrubs. VIBURNUM (p. 365)
- BB. Leaves pinnately veined; fruit dry or berry-like.
- C. Leaves coriaceous, evergreen, blade not over 2 cm. long; fruit dry, 1-seeded; shrubby herb, prostrate, vine-like, creeping. LINNAEA (p. 366)
- CC. Leaves not coriaceous, not evergreen, blade usually larger; fruit berry-like, 2—4-seeded; plainly a shrub or tree, vine to erect, often climbing or reclining.
- D. Corolla regular, 12 mm. or less long; ovary 4-celled; berry white, 2-seeded; leaves entire or dentate or irregularly lobed, not united at base; shrub, erect or rarely trailing. SYMPHORICARPOS (p. 366)
- DD. Corolla irregular, 12 mm. or more long; ovary 2—3-celled; berry red or black, 2—4-seeded; leaves entire or merely sinuate, upper pair sometimes united at base; shrubs or trees, erect or often trailing or a climbing vine. LONICERA (p. 366)

SAMBUCUS

ELDER

Ours shrubs or trees. Leaves pinnately compound; leaflets serrate to lacinate. Flowers small, white or pinkish, in cymes. Calyx-tube ovoid or turbinate. Corolla rotate, slightly campanulate, regular. Stamens 5, on base of corolla. Ovary 3—5-celled; style 3-parted. Fruit berry-like, containing 3—5 1 seeded-nutlets. (Gk. sambuke=a musical instrument; said to have been made of Elder.)

- A. Inflorescence flat-topped; pith in 1-year-old stems white or slightly brownish; berries black but gray with a bloom. W. C. E. (*S. ferax*; *S. decipiens*)
S. glauca Nutt. (Tree Elder)
- AA. Inflorescence conic; pith in 1-year-old stems yellowish brown.
- B. Fruit black, without a bloom; leaves blackening in drying. C. E.
S. melanocarpa Gray (Black Elder)
- BB. Fruit bright red to yellow; leaves not blackening in drying. W. C. E. (*S. pubens*; *S. leiosperma*; *S. arborescens*)
S. callicarpa Gr. (Red Elder)

VIBURNUM

ARROW-WOOD

Shrubs or trees. Leaves entire to lobed, ours palmately veined. Flowers white or rarely pink, in compound cymes, the outer flowers sometimes ray-like and neutral. Calyx-tube ovoid or turbinate; limb short. Corolla rotate or short-campanulate, regular. Stamens 5, exserted. Ovary 1—3-celled; cells 1-ovuled; style 3-lobed or -parted. Drupe ovoid or globose, in ours red or black. Seed 1, flattish. (Said to be from L. viere—to tie; because the twigs of some are very pliable.)

- A. Leaves or some of them 3-lobed; fruit red, its stone not or hardly grooved on either face.
- B. Erect shrub; outer flowers of the cyme much larger than the others; cyme 6—10 cm. wide. W. C. V. opulus L. (High-bush Cranberry)
- BB. Straggling shrub; outer flowers of the cyme not larger than the others; cyme 1—3 cm. wide. C. E. V. pauciflorus Pyl. (Squash-berry)
- AA. Leaves not lobed, merely dentate above the middle; fruit black, its stone grooved on both faces; cyme 4—10 cm. wide, its outer flowers not larger than the others. W. C. E. V. ellipticum Hook. (Black Haw)

LINNAEA

TWIN-FLOWER

Herb or shrub, creeping or trailing. Leaves evergreen, coriaceous, petioled, ovate or obovate to orbicular, entire to crenate, 8—25 mm. long. Flowers pink or purplish, in 2's at the top of long terminal peduncles. Corolla tubular-campanulate, 10—16 mm. long (ours), regular. Stamens 4, on the corolla near base, didynamous, included. Ovary 3-celled. Fruit nearly globose, 3-celled, dry. Seed 1, oblong. (Honor of C. von Linnaeus, the great Swedish botanist.) W. C. E. (*L. borealis* for our region; *L. longiflora*.)
L. americana Forbes

SYMPHORICARPOS

SNOW-BERRY

Shrubs, low, branching; buds scaly. Leaves entire to lobed, short-petioled, pinnately veined. Flowers small, 2-bracteolate, either solitary in the leaf-axils or else in terminal or axillary clusters, white or rose-colored. Calyx-tube spherical. Corolla regular, short-campanulate to salverform. Stamens 5, on the corolla-throat. Stigma capitate or 2-lobed. Berry globose, 4-celled, white (ours). Seeds 2, oblong. (Gk. syn=together, phero=I bear, karpos=fruit; from the clustered berries.)

A. Corolla 2—4 mm. long.

B. Erect; leaves glabrous. W. C. E.

S. racemosus Michx.

BB. Trailing; leaves pubescent. W. C. E.

S. mollis Torr.

AA. Corolla 6—12 mm. long.

C. Corolla-tube 2—3 times as long as its lobes; leaves tomentulose or pubescent.

D. Leaves entire or coarsely lobed, orbicular to oblong-elliptic, obtuse to rounded at both ends. E. *S. rotundifolius* Gray

DD. Leaves entire or dentate, elliptic to oblong-lanceolate, acute to obtuse at both ends. C. E. (*S. acutus*; *S. rotundifolius vaccinoides*.)

S. rotundifolius acutus (How.)

CC. Corolla-tube 4—5 times as long as its lobes; leaves glabrous or sparsely hairy.

E. *S. oreophilus* Gray

LONICERA

HONEY-SUCKLE

Shrubs or small trees, erect or climbing. Leaves mostly entire, pinnately veined. Flowers in spikes or heads or pairs, usually somewhat irregular, various in color. Calyx-tube ovoid or nearly spherical; limb slightly 5-toothed. Corolla tubular to campanulate, often gibbous at base, either somewhat oblique or 2-lipped. Stamens 5. Stigma capitate. Fruit berry-like, fleshy, ours 2—3-celled. Seeds few, ovoid or oblong. (Honor of A. Lonitzer, a German botanist.)

A. Climbing or twining or trailing, vine-like; flowers in terminal clusters; upper pair of leaves united at base.

B. Flowers orange to scarlet; young stem glabrous.

C. Corolla 25—40 mm. long, its tube many times as long as its lower lip; leaf-margin usually ciliate. W. C. E. (*Caprifolium ciliosum*.)

L. ciliosa Poir. (Orange Honey-suckle)

CC. Corolla 12—16 mm. long, its tube less than twice as long as its lower lip; leaf-margin not ciliate. U. (*Caprifolium californicum*.)

L. californicum T. & G. (California Honey-suckle)

BB. Flowers pink; young stem hairy. W. (*Caprifolium hispidulum*.)

L. hispidula Dougl. (Pink Honey-suckle)

- AA. Erect, the branches sometimes long and reclining on other shrubs; flowers in pairs on axillary peduncles; upper pairs of leaves not united.
- D. Pair of flowers or fruits subtended by narrow or minute bracts, or bractless.
- E. Leaves green on both sides; fruit red.
- F. Corolla whitish, its lobes nearly equal; leaves obtuse. W. C. E. (*Xylosteum utahense*; probably *L. sororia*.)
L. utahensis Wats. (Red Twin-berry)
- FF. Corolla dark purple, 2-lipped; leaves acute or acuminate. C. E. (*Xylosteum conjugialis*.)
L. conjugialis Kell.
- EE. Leaves somewhat pale beneath; fruit blue-black; corolla yellowish, 2-lipped.
- C. (*Xylosteum villosum*.) *L. coerulea* L. (Edible Twin-berry)
- DD. Pair of flowers or fruits subtended by large wide leaf-like bracts; flowers yellow; fruit black. W. C. E. (*Xylosteum involucratum*; *Xylosteum ledebouri*.)
L. involucrata Banks (Black Twin-berry)

VALERIANACEAE

Valerian Family

Herbs, annual or perennial. *Leaves opposite; stipules none*. Flowers usually small, perfect or dioicous, in corymbose or paniculate or capitate cymes. Calyx-limb inconspicuous or none in the flower, often becoming prominent in fruit. Corolla somewhat irregular; tube sometimes gibbous or spurred at base; limb spreading, mostly 5-lobed. Stamens 1—4, on the corolla, alternate with corolla-lobes, usually exserted. *Ovary inferior*, 1—3-celled, 1 cell 1-ovuled, other cells empty when present; style 1. *Fruit dry*, indehiscent. *Seed* 1.

A. Annual; calyx-teeth not plumose; fruit 3-celled; leaves entire to dentate; flowers white or pink or blue. VALERIANELLA (p. 367)

AA. Perennial; calyx-teeth plumose; fruit 1-celled; leaves entire to compound; flowers white or pink or yellowish. VALERIANA (p. 368)

VALERIANELLA (Plectritis)

CORN-SALAD

Annual. Basal-leaves tufted, entire; stem-leaves sessile, often dentate. Flowers small, perfect. Calyx-limb short or none, not divided into filiform plumose segments. Corolla small, white or pink or blue, nearly regular; tube narrowed at base; limb 5-lobed. Stamens 3. Fruit 3-celled. (Diminutive of *Valeriana*, a related genus.)

A. Stems not dichotomous; corolla white or pink; leaf-margin not ciliate.

B. Corolla 6—7 mm. long, rose-color, the spur half as long as the tube or less; fruit strongly keeled on the back, broadly winged. W. C. E.

V. congesta Lindl.

BB. Corolla 1—3 mm. long.

C. Spur of the corolla about as long as the tube; fruit obscurely keeled on the back.

D. Wing of the fruit wide, as long as the fruit-body. E.

V. macrocera Gray

DD. Wing of the fruit narrow, shorter than the body. E.

V. mamillata Pip.

CC. Spur of the corolla none or about half as long as the tube; fruit strongly keeled on the back.

E. Corolla spurred.

F. Fruit wingless. W. C. E.

V. samolifolia Gray

FF. Fruit winged. U. E.

V. aphanoptera Gray

EE. Corolla spurless; fruit winged.. W. C. E.

V. anomala Gray

AA. Stems dichotomous; corolla pale blue; upper leaves ciliate at margin. W.

V. olitoria Poll.

VALERIANA

VALERIAN

Perennial, mostly tall, strong-smelling. Leaves chiefly basal, simple or pinnately odd-compound. Flowers white or yellowish or pinkish, perfect or dioicous or the two mixed. Calyx-teeth merely plumose bristles, deciduous, inrolled and hidden when in bloom. Corolla-tube cylindric to obconic, often gibbous, not spurred; limb about equally 5-lobed. Stamens 3. Fruit flattish, 1-celled, 1-veined behind, 3-veined in the front. (Said to be from *L. valere*=to be strong; on account of the medicinal properties of *V. officinalis*.)

A. Leaflets of the stem-leaves coarsely dentate, ovate-lanceolate to orbicular; flowers 6—8 mm. long; plant from a creeping rhizome. W. C. E.

V. sitchensis Bong.

AA. Leaflets of the stem-leaves entire or the terminal one merely 3-cleft.

B. Corolla 4—8 mm. long, its tube less than twice as long as its limb.

C. Basal leaves mostly of 3—5 leaflets; divisions of the stem-leaves ovate-lanceolate to orbicular; plant from a creeping rhizome. W. C. E.

V. sitchensis scouleri Pip.

CC. Basal leaves mostly simple and entire; divisions of the stem-leaves linear to lanceolate.

D. Leaves thick, entire or the segments not dentate, veins somewhat parallel; stems from an erect fusiform rhizome-root. E. (*V. edulis*.)

V. ceratophylla Pip. (Tobacco-root)

DD. Leaves thin, entire or the segments dentate, veins reticulate; stems from horizontal rhizomes. C.

V. sylvatica Banks (Wood Valerian)

BB. Corolla 14—15 mm. long, its tube twice as long as its limb. E.

V. columbiana Pip.

DIPSACACEAE

Teasel Family

Herbs. Leaves opposite (ours) or rarely whorled; *stipules none. Flowers perfect, in dense involucrate spiny heads*, subtended by bracts and involucels; receptacle elongated or globose. Calyx-limb cup-shaped (ours). Corolla-tube usually enlarged at the throat; limb 2—5-lobed. Stamens 2—4 (ours), on corolla-tube, alternate with the lobes; anthers versatile. Ovary inferior, 1-celled; style filiform; stigma entire, terminal or obliquely lateral. Fruit an akene, crowned with the persistent calyx-lobes.

DIPSACUS

TEASEL

Ours biennial, rough-hairy or prickly, tall. Leaves entire to pinnatifid, usually large. Flowers blue or lilac (ours); heads terminal, peduncled, oblong; involucre- and receptacle-bracts spiny (ours); involucels 4—8-veined. Calyx-limb 4-toothed or -lobed. Corolla oblique or 2-lipped, 4-lobed. (Gk. *dipsen*=to thirst; because the leaf-bases of some catch water.) W. E.

D. sylvestris Huds.

CUCURBITACEAE**Squash Family**

Herbs, vines, climbing or trailing, ours with tendrils. Leaves alternate, petioled, ours palmately lobed. Flowers solitary or racemose, monoicous (ours) or dioicous. Calyx-limb campanulate (ours) to tubular, usually 5-lobed. Corolla rotate; limb deeply 5-lobed (ours). Stamens 1—5, filaments short, often somewhat monadelphous (ours) or triadelphous. Style 1, terminal; stigma simple or lobed. Fruit fleshy or dry, indehiscent or rarely dehiscent at the summit (ours) or bursting irregularly. Seed few to many, flat in ours.

ECHINOCYSTIS (Marah, Micrampelis)

Ours perennial, 3—9 m. long, tendrils 2—5-branched. Leaves in ours 5—7-angled or -lobed; stipules none. Flowers white, monoicous: staminate flowers in racemes (ours) or panicles, without pistil, 10—20 in a cluster (ours): pistillate flowers solitary or in the same leaf-axil as the staminate, without stamens in ours. Calyx campanulate. Corolla rotate, 6—8 mm. wide (ours). Stamens in ours 3, mostly monadelphous. Ovary prickly, ours 2—4-celled; placentae 2. Fruit small, egg-shaped, opening by 1—2 pores or lids, ours fleshy and becoming dry. Seeds 1—several. (Gk. echinos=a hedgehog, kystis=a bladder; referring to the prickly inflated fruit.) W. E.

E. oregana Cogn. (Wild Cucumber)

CAMPANULACEAE**Bell-flower Family**

Herbs, annual or perennial. Leaves alternate, simple; stipules none. Flowers regular, either solitary in the leaf-axils or else in racemes, white or blue or violet. Calyx 3—5-lobed. Corolla sympetalous, 5-lobed, rotate to campanulate; lobes valvate in the bud. Stamens 5, usually free from the corolla, distinct. Ovary inferior; style 1; stigmas mostly 2—5. Fruit a capsule (ours) or berry, prismatic or terete, often oblong or longer, 2—5-celled, opening by terminal or lateral pores, or bursting irregularly. Seeds many, small.

A. Stem-leaves lanceolate or spatulate to linear, petioled or sessile, not clasping.

B. Calyx-lobes not over 1 cm. long, perennial; leaves sessile or petioled.

CAMPANULA (p. 369)

BB. Calyx-lobes 2—4 cm. long, annual; leaves sessile.

GITHOPSIS (p. 370)

AA. Stem-leaves ovate to orbicular, sessile, clasping; annual.

C. Calyx-lobes triangular-lanceolate, entire; corolla rotate; capsule opening by lateral pores; seed lens-shaped.

SPECULARIA (p. 370)

CC. Calyx-lobes triangular-ovate, somewhat toothed; corolla open-campanulate; capsule bursting irregularly; seed obscurely 3-angled.

HETEROCODON (p. 370)

CAMPANULA**BELL-FLOWER**

Ours perennial. Leaves sometimes all basal. Flowers white or blue or violet. Calyx-tube hemispheric to prismatic. Corolla campanulate (ours). Ovary 3—5-celled; stigma 3—5-lobed. Capsule crowned by the persistent calyx-lobes, opening by 3—5 lateral holes. (Diminutive of *L. campana*=a bell; referring to the corolla.)

A. Stem-leaves ovate to lanceolate; corolla-lobes spreading; style long-exserted.

B. Stems not clustered; leaves acuminate; pedicel longer than the flower. W. C. E.

C. scouleri Hook.

BB. Stems clustered; leaves acute; pedicel shorter than the flower. U.

C. prenanthoides Dur.

- AA. Stem-leaves linear or spatulate or cuneate; corolla-lobes erect; style included.
 C. Plant puberulent; leaves all entire; basal-leaves spatulate; stem-leaves mostly linear. C. E. *C. scabrella* Engelm.
 CC. Plant glabrous; at least the basal leaves not entire.
 D. Stem-leaves spatulate-oblongate, dentate; basal-leaves similar in form to the stem-leaves; capsule opening near the top. W. *C. piperi* How.
 DD. Stem-leaves linear, entire; basal leaves orbicular to cordate; capsule opening near base. W. C. E. *C. rotundifolia* L. (Blue-bell)

SPECULARIA (Legouzia) VENUS LOOKING-GLASS

Annual, pubescent (ours). Leaves alternate, in ours toothed, ovate to orbicular, strongly clasping, 12—25 mm. long. Flowers in groups of 1—3 in the leaf-axils, sessile or nearly so; 2-bracted: 4 lowest flowers cleistogamous, small: calyx 3—4-lobed: corolla rudimentary. Other flowers larger: calyx 4—5-lobed, its tube narrow: corolla blue or purple or violet, 1—2 cm. wide (ours). Capsule opening by lateral valves. Seeds in ours lens-shaped. (L. speculum—a mirror; referring to the corolla of the European *S. speculum*.) W. E. *S. perfoliata* DC.

HETEROCODON

Annual, slender, in wet places, sparingly hairy (ours). Leaves sessile; in ours orbicular, cordate and clasping at base, coarsely many-toothed, 8—16 mm. long. Flowers solitary in the leaf-axils and terminal, of two forms. Lower flowers cleistogamous: with corolla rudimentary. Calyx-tube short; lobes leaf-like, 2—6 mm. long (ours). Corolla of upper flowers blue, short-campanulate, 4—8 mm. long (ours). Capsule obovoid, 3-angled, 3-celled, thin walled, membranous, bursting irregularly. Seeds oblong, obscurely 3-angled. (Gk. heteros=different, kodon=a bell; referring to the 2 forms of flowers.) E. *H. rariflorum* Nutt.

GITHOPSIS

Annual. Leaves in ours linear-oblong, coarsely toothed, sessile. Flowers blue, all alike. Calyx-tube club-shaped, strongly 10-veined; its lobes long, narrow, leaf-like. Corolla-tube campanulate. Ovary 3-celled; stigma 3-lobed. Capsule club-shaped, coriaceous, crowned with the rigid calyx-lobes, strongly striate-ribbed, opening by a narrow hole where style drops off. Seed smooth. W. E. (*Githago* is another genus of plants, Gk. opsis=like.) *G. specularioides* Nutt.

LOBELIACEAE

Lobelia Family

Herbs (ours) or rarely shrubs, often with milky or acrid juice. Leaves alternate, simple; stipules none. Flowers perfect, parts in 5's, in racemes or solitary in the leaf-axils. Calyx 1-lobed. Corolla-tube sometimes split down 1 side partly or wholly to base; limb 2-lipped. Anthers and rarely the filaments united about the style. Ovary inferior or $\frac{1}{2}$ -inferior, 1—2-celled; style 1; stigma usually 2-lobed, with a rim of hairs. Seeds small.

- A. Plants merely of wet places, not aquatic; flowers blue.
 B. Leaves wavy-denticulate or some of them entire; capsule free from the calyx at its top; corolla cleft to the base on one side. LOBELIA (p. 371)
 BB. Leaves all entire; capsule wholly inferior.

C. Calyx-tube oblong or shorter; capsule short; stems creeping or diffuse, rooting at the nodes; corolla without white or yellow center. *LAURENTIA* (p. 371)

CC. Calyx-tube 10 or more times as long as wide; capsule 2—7 cm. long; stems diffuse or erect, not rooting at the nodes; corolla with white or yellow center. *DOWNINGIA* (p. 371)

AA. Plants aquatic; submerged leaves linear-setaceous or terete.

D. Submerged leaves 2—5 cm. long, all in a basal tuft; perennial; corolla blue. *LOBELIA* (p. 371)

DD. Submerged leaves 5—15 cm. long, scattered along an elongated stem; annual; corolla white. *HOWELLIA* (p. 372)

LOBELIA (*Rapuntium*)

LOBELIA

Annual or perennial (ours). Leaves alternate, sometimes all basal, simple. Flowers in ours blue, in racemes, bracted. Calyx-tube turbinate or hemispheric or ovoid. Corolla-tube divided to base on 1 side; lobes adjacent to the cleft erect or recurved, turned away from the other 3. Stamens free from corolla; monadelphous at least above; 2 or 5 of the anthers with a tuft of hair at tip, 3 usually larger. Ovary 2-celled; stigmas 2. Capsule 2-valved, loculicidal. Seeds many. (Honor of M. de l'Obel, a Flemish botanist.)

A. Aquatic; leaves all basal, terete, hollow. W.

L. dortmanna L. (Water Lobelia)

AA. Terrestrial; most of the leaves scattered along the stem, flat, linear to spatulate. E. *L. kalmii* L.

LAURENTIA

Diffuse or creeping; ours annual, 2—12 cm. long, in wet places. Leaves in ours entire, linear to lanceolate, sessile, 6—12 mm. long. Flowers solitary in the leaf-axils and somewhat corymbose or racemose above, blue. Calyx-tube turbinate or oblong (ours); lobes narrow. Corolla-tube 6—8 mm. long (ours), as long as the limb, not split; larger lip 3-cleft, widely spreading, smaller lip 2-lobed, its lobes erect or divergent. Stamens barely exerted; filaments and anthers completely united; 2 anthers with a tuft of hair at tip. Capsule 2-celled, 2-valved. Seeds many, oblong or almost fusiform. (Honor of M. A. Laurenti, an Italian botanist.) E.

L. carnulosa Benth.

DOWNINGIA (*Bolelia*)

Annual, glabrous, in wet places. Leaves sessile, entire, the upper reduced to bracts. Flowers solitary in the leaf-axils, sessile, deep blue with white or yellow center. Calyx-tube adherent to the ovary, very long and slender, 3-sided, usually twisted; limb divided down to the ovary into 5 leaf-like lobes. Corolla-tube short, not split; large lip very wide, 3-lobed; smaller lip 2-lobed. Filaments and anthers both united into a somewhat curved tube; 2 anthers with a tuft of hair at tip. Capsule 2—7 cm. long (ours), 2-celled but soon becoming 1-celled, opening by 1—3 long cracks. Seeds many. (Honor of A. J. Downing, an American horticulturist.)

A. Leaves acute, lanceolate to ovate; 2 lobes of the smaller lip of the corolla lanceolate. E. *D. elegans* Torr.

AA. Leaves mostly obtuse, lanceolate to linear; 2 lobes of the smaller lip of the corolla ovate-oblong. U. E. *D. pulchella* Torr.

HOWELLIA

Annual, aquatic, 1—5 dm. high. Leaves alternate, submerged ones linear-setaceous and entire, emersed ones linear to oblong and sometimes slightly toothed. Flowers of 2 forms; submerged ones apetalous, axillary, short-peduncled. Calyx-tube slender; lobes nearly equal, narrow, 4—8 mm. long. Corolla 4—8 mm. long, white; tube short, split nearly to base; limb nearly equally 5-lobed. Stamen tube nearly free; 2 smaller anthers each with 3 hairs. Ovary 1-celled. Capsule membranous, about 12 mm. long, long club-shaped, bursting irregularly on one side. Seeds few, large, smooth, white. (Honor of J. and T. Howell, Oregon botanists.) W.

H. aquatilis Gray

COMPOSITACEAE (Compositae) Composite Family

Herbs or shrubs or trees (not ours). Leaves various in form and arrangement. *Flowers in heads*, often of 2 kinds, their parts in 4's or 5's; *heads involucrate*. Calyx-limb none or cup-like, or of teeth or scales or awns or capillary bristles, *often serving as a means of seed-dispersal*. Corolla on the calyx, tubular or strap-shaped, or the inner tubular (disk-flowers) and the outer strap-shaped (ray-flowers). Stamens as many as corolla-lobes, alternate with them, on the corolla-tube; *anthers syngenesious*. Ovary 1-celled, ovule 1; style 1, *stigmas 2 in fertile flowers*. *Fruit an akenes*.

A plant may be traced to its tribe by the scientific key immediately following, or by the artificial key on page 373, or by both.*

Scientific Key to the Tribes

- A. Corolla all tubular and regular, or only the marginal ones ligulate.
- B. Heads rayless or radiate; anther not tailed at base; style-branches either truncate or tipped with an appendage.
- C. Heads rayless; flowers never yellow, all perfect; style-branches clavate.
EUPATOREAE (p. 374)
- CC. Heads usually radiate, very rarely both rayless and yellow; style-branches rarely clavate.
- D. Style-branches of the perfect flowers either flat or tipped with a distinct appendage; leaves mostly alternate.
ASTEREAE (p. 375)
- DD. Style branches of the perfect flowers truncate or appendaged but not flattened; leaves often opposite.
- E. Involucre not scarious.
- F. Pappus none or not capillary.
- G. Receptacle chaffy.
HELIANTHEAE (p. 395)
- GG. Receptacle chaffy except in *Gaillardia*. HELENEAE (p. 404)
- FF. Pappus capillary; receptacle not chaffy.
SENECEAE (p. 411)
- EE. Involucre scarious; pappus none or not capillary; receptacle not chaffy except in *Anthemis* and *Achillea*.
ANTHEMEAE (p. 407)
- BB. Heads rayless except *Inula*; anthers tailed at base; style-branches neither truncate nor tipped with an appendage.
- H. Corollas not deeply cleft; receptacle not bristly except *Evax*.
- HH. Corolls deeply cleft; receptacle bristly.
CYNAREAE (p. 417)
- AA. Corolls all ligulate, all perfect.
CICHOREAE (p. 420)

*The artificial key is an attempt to reach the tribes without using the style-branches and the anther-bases, two points at which the student very often has trouble.

Artificial Key to the Tribes

- A. Herbs.
- B. Flowers either all tubular or the outer ligulate and the inner tubular; juice rarely milky.
- C. Pappus of capillary or plumose bristles.
- D. Heads radiate.
- E. Rays yellow.
 - F. Heads 3—10 cm. wide; basal leaves 2—5 dm. long, 1—2 dm. wide, oblong, denticulate. INULEAE (p. 391)
 - FF. Heads less than 2 cm. wide; leaves smaller.
 - G. Involucre-bracts in more than 2 series. ASTEREEAE (p. 375)
 - GG. Involucre-bracts in 1—2 series.
 - H. Rays 20—30 or more. ASTEREEAE (p. 375)
 - HH. Rays fewer. SENECEAE (p. 411)
- EE. Rays not yellow.
 - I. Flowers appearing before the foliage-leaves; staminate and pistillate flowers on separate plants; foliage-leaves large, palmately lobed, all basal. SENECEAE (p. 411)
 - II. Flowers on foliage-bearing stems, or appearing after the leaves when they are all basal; leaves not as above. ASTEREEAE (p. 375)
- DD. Heads rayless.
- J. Heads distinctly yellow.
 - K. Involucre-bracts white, many, almost hiding the few small yellow flowers, the most prominent feature of the head. INULEAE (p. 391)
 - KK. Involucre-bracts either not white, or not the most prominent feature of the head.
 - L. Corolla deeply 5-lobed. CYNAREAE (p. 417)
 - LL. Corolla with 4—5 merely triangular teeth.
 - M. Involucre-bracts in more than 2 series. ASTEREEAE (p. 375)
 - MM. Involucre-bracts in 1—2 series.
 - N. Akenes not ribbed, flattish, with 0—4 lateral veins. ASTEREEAE (p. 375)
 - NN. Akenes 5—15-ribbed. SENECEAE (p. 411)
- JJ. Heads not yellow; corolla often hidden in white wool or so inconspicuous that it shows little if any color.
- O. Leaves large, palmately lobed, squash-leaf-like. SENECEAE (p. 411)
- OO. Leaves pinnately veined.
- P. Corolla deeply lobed. CYNAREAE (p. 417)
- PP. Corolla with 4—5 merely triangular teeth.
- Q. Leaves white-woolly at least beneath. INULEAE (p. 391)
- QQ. Leaves not white-woolly.
- R. Akenes 5—15-ribbed or striate. EUPATOREAE (p. 374)
- RR. Akenes flattish, 0—4-veined. ASTEREEAE (p. 375)
- CC. Pappus none, or of scales, or of rigid bristles.
- S. Heads radiate.
- T. Rays yellow.
- U. Receptacle chaffy.
 - V. Leaves in most species opposite at least below; involucre not scarious. HELIANTHEAE (p. 395)
 - VV. Leaves alternate; involucre scarious. ANTHEMEAE (p. 407)
- UU. Receptacle not chaffy.

- W. Leaves opposite. HELENEAE (p. 404)
- WW. Leaves alternate.
- X. Involucre gummy but not glandular-hairy, glabrous. ASTEREAE (p. 375)
- XX. Involucre not gummy, or merely with glandular hairs if sticky.
- Y. Herbage resinous, glabrous. ASTEREAE (p. 375)
- YY. Herbage not resinous, mostly not glabrous. HELENEAE (p. 404)
- TT. Rays not yellow.
- Z. Involucre-bracts scarious or scarious-margined.
 - a. Leaves pinnately dissected or compounded. ANTHEMEAE (p. 407)
 - aa. Leaves entire. ASTEREAE (p. 375)
- ZZ. Involucre-bracts herbaceous thruout.
 - b. Leaves all basal. ASTEREAE (p. 375)
 - bb. Leaves not all basal. HELIANTHEAE (p. 395)
- SS. Heads rayless.
 - c. Involucre gummy but not glabrous; flowers yellow. ASTEREAE (p. 375)
 - cc. Involucre not gummy or merely glandular-hairy if sticky.
 - d. Corolla deeply lobed; flowers rarely yellow. CYNAREAE (p. 417)
 - dd. Corolla with 4—5 merely triangular teeth.
 - e. Receptacle chaffy or hairy.
 - f. Plants pubescent with jointed hairs. HELENEAE (p. 404)
 - ff. Plants without jointed hairs. HELIANTHEAE (p. 395)
 - ee. Receptacle neither chaffy nor hairy.
 - g. Heads distinctly white; at least the inflorescence very glandular. INULEAE (p. 391)
 - gg. Heads yellowish or brownish or purplish; plant usually not glandular.
 - h. Salt-marsh plants. ANTHEMEAE (p. 407)
 - hh. Not salt-marsh plants.
 - i. Involucre-bracts scarious at least at margin.
 - j. Leaves entire. INULEAE (p. 391)
 - jj. Leaves not entire. ANTHEMEAE (p. 407)
 - ii. Involucre-bracts not scarious tho sometimes bur-like. HELENEAE (p. 391)
- BB. Flowers all ligulate; juice milky in most. CICHOREAE (p. 420)
- AA. Shrubs.
 - k. Leaves glabrous or pubescent but not hoary.
 - l. Flowers white or pinkish. EUPATOREAE (p. 374)
 - ll. Flowers yellow. ASTEREAE (p. 375)
 - kk. Leaves hoary with white or woolly hairs.
 - m. Pappus of capillary bristles.
 - n. Involucre of 4—6 bracts. SENECEAE (p. 411)
 - nn. Involucre of more than 6 bracts. ASTEREAE (p. 375)
 - mm. Pappus none. ANTHEMEAE (p. 407)

EUPATOREAE (BONE-SET TRIBE)—Ours perennial. Leaves in ours entire to dentate. Heads rayless, all alike, in ours 10—50-flowered; receptacle in ours naked, flat. Flowers perfect, fertile; corolla tubular, regular, 5-toothed, never yellow. Anthers without tails at base. Style-branches somewhat club-shaped, obtuse. Pappus-bristles capillary, in 1 series, scabrous to almost plumose.

A. Akenes 5-angled, without intermediate ridges or lines; involucre-bracts nearly veinless. EUPATORIUM (p. 375)

AA. Akenes 10-ribbed or -striate; involucre-bracts striate-veined.

COLEOSANTHUS (p. 375)

EUPATORIUM

BONE-SET

Herbs or sometimes shrubby, erect; ours glabrous, 2—6 dm. high. Leaves mostly entire; in ours alternate or opposite, entire or wavy or dentate, ovate, short-petioled, 3-veined near the base. Heads in ours 15—25-flowered, in panicles; involucre cylindric or campanulate; bracts in 1—3 or more series; receptacle naked, flat. Corolla purple or blue or white. Anthers included. Akenes 5-angled, without intermediate ridges or lines. (Honor of Mithridates Eupator, King of Pontius, who first used one of these in medicine.)

E. *E. occidentale* Hook.

COLEOSANTHUS (Brickellia)

THOROWORT

Herbs or shrubs, mostly glandular or viscid. Leaves alternate or opposite. Heads variously arranged; ours 10—50-flowered; involucre campanulate; bracts in more than 1 series, linear to ovate, striate-veined, none herbaceous, the outer the shorter; receptacle flat, naked. Corolla slender, white or pinkish; teeth usually glandular outside. Style bulbous at base. Akene 10-ribbed or -striate. (Gk. koleos=a sheath, anthos=a flower; probably referring to the involucre.)

A. Heads 10—20-flowered, 6—12 mm. high.

B. Plant glandular; leaves 10—25 mm. long; outer involucre-bracts with greenish somewhat spreading tips. E. *C. microphyllus* Kuntze

BB. Plant not glandular; leaves 5—15 mm. long; involucre-bracts all without green tips. U. *C. californicus* Kuntze

AA. Heads 35—50-flowered, 12—18 mm. high.

C. Leaves ovate.

D. Plant puberulent or almost glabrous, not viscid, 6—9 dm. high; leaves somewhat deltoid, truncate or cordate at base, mostly acuminate, slender-petioled. E.

C. grandiflorus Kuntze

DD. Plant very viscid-pubescent, 2—4 dm. high; leaves ovate, obtuse, acuminate, sessile or hardly petioled. U. E. *C. greenii* Kuntze

CC. Leaves oblong or elliptical-lanceolate.

E. Akenes glandular, with a few scattered bristles; outer involucre-bracts oblong-lanceolate. E. *C. oblongifolius* Kuntze

EE. Akenes not glandular, with a double row of bristles along the longitudinal grooves; outer involucre-bracts ovate. E.

C. linifolius Kuntze

ASTEREAE (ASTER TRIBE)—Leaves mostly alternate. Heads radiate or rayless, all alike (except staminate and pistillate on separate plants in *Baccharis*), receptacle naked (ours). Ray-flowers pistillate or rarely neutral. Corolla of disk flowers nearly always yellow, regular, tubular, 4—5-lobed: style-branches flat, appendaged. Anthers not tailed at base. Pappus none or various, in most species of capillary bristles.

A. Rays none or very inconspicuous.

B. Herbs tho sometimes woody at base; hairy or glabrous, not usually sticky; heads all alike.

C. Pappus of 2—8 rigid awns; involucre glabrous and shining but very gummy.

GRINDELIA (p. 377)

- CC. Pappus of scabrous capillary bristles; involucre often glandular but then not glabrous.
- D. Involucre-bracts in 2—6 vertical rows. CHRYSOTHAMNUS (p. 382)
- DD. Involucre-bracts not in vertical rows.
- E. Leaves all entire.
- F. Heads only 1 on a stem.
- G. Involucre glandular; plant 15—30 cm. high, white-tomentose. APLOPAPPUS (p. 379)
- GG. Involucre hairy, not glandular; plant 5—15 cm. high, white-puberulent to glabrous. ERIGERON (p. 388)
- FF. Heads more than 1 on a stem.
- H. Plant white-tomentose; involucre glandular. APLOPAPPUS (p. 379)
- HH. Plant not tomentose; involucre rarely glandular.
- I. Involucre-bracts recurved at tip. (Machaerantherae) ASTER (p. 383)
- II. Involucre-bracts appressed or erect, not recurved.
- J. Involucre-bracts in 1—3 whorls, herbaceous; annual or biennial. ERIGERON (p. 388)
- JJ. Involucre-bracts in 3 or more whorls, scarious, often with green tips, thin or firm; perennial.
- K. Leaves oblong; plant viscid-pubescent, 1.5—3 dm. high. CHRYSOPSIS (p. 378)
- KK. Leaves ovate-lanceolate; plant glabrous or nearly so, not viscid, 6—9 dm. high. (Eucephalae) ASTER (p. 383)
- EE. Leaves or at least the lower ones not entire.
- L. Teeth of the leaves spinulose-tipped. APLOPAPPUS (p. 379)
- LL. Teeth of the leaves not spinulose-tipped. (Machaerantherae) ASTER (p. 383)
- LLL. Leaves or nearly all of them entire.
- M. Involucre-bracts recurved at tip. ERIGERON (p. 388)
- MM. Involucre-bracts erect or appressed at tip, not recurved. ASTER (p. 383)
- BB. Shrubs, glabrous but sticky; staminate and pistillate heads on separate plants. BACCHARIS (p. 391)
- AA. Rays yellow.
- N. Pappus of scales or rigid awns.
- O. Heads large, 10—25 mm. high, many-flowered; pappus of 2—8 rigid awns; involucre-bracts often gummy, often recurved at tip. GRINDELIA (p. 378)
- OO. Heads small, 4—6 mm. high, 2—20-flowered; pappus of 4—14 scales; involucre-bracts often gummy, often recurved at tip. GRINDELIA (p. 377)
- NN. Pappus or most of it of capillary bristles.
- P. Pappus of 2 distinctly different whorls, an inner of scabrous capillary bristles, an outer of small scales or bristles.
- Q. Involucre-bracts in several indistinct whorls, the outer distinctly shorter. CHRYSOPSIS (p. 378)
- QQ. Involucre-bracts in 1—2 indistinct whorls, all about equal. ERIGERON (p. 388)
- PP. Pappus of a single whorl of bristles or else the whorls alike when more than 1.
- R. Involucre-bracts not in vertical rows; rays rarely fewer than 5; leaves various; herbs or shrubs.
- S. Pappus-bristles equal or nearly so; heads 3—12 mm. wide. SOLIDAGO (p. 378)

- SS. Pappus-bristles unequal; heads often more than 12 mm. wide.
- T. Leaves often not as in TT in all characters; involucre hemispheric or widely campanulate; herb or shrub, viscid or not. *APLOPAPPUS* (p. 379)
- TT. Leaves spatulate to filiform, 6—25 mm. long, sessile, entire; involucre narrowly campanulate to oblong; shrub, viscid.
ERICAMERIA (p. 382)
- RR. Involucre-bracts in 3—4 vertical rows; rays 1—4; leaves narrowly linear or spatulate-linear; shrub.
CHRYSOTHAMNUS (p. 382)
- AAA. Rays some color other than yellow.
- U. Pappus none or of scales or of small hair-like bristles or of stout awn-like bristles, in one whorl.
- V. Plant glabrous, 3—18 dm. high; heads many; rays white; pappus of several small scales and 2 small stiff bristles. *BOLTONIA* (p. 383)
- VV. Plant puberulent to very hairy, acaulescent to 4 dm. high; heads few in most species; rays various; pappus of ray flowers either none or of more than 2 bristles.
- W. Scapes leafless and bractless; leaves obovate to spatulate, entire or obscurely dentate; pappus either none or a ring of minute bristles. *BELLIS* (p. 382)
- WW. Scapes sometimes leafy below, bracted; leaves spatulate to linear, entire; pappus a ring of stout rough awn-like bristles. *TOWNSENDIA* (p. 383)
- UU. Pappus of many capillary bristles, sometimes in 2 whorls and then the outer sometimes of shorter bristles or of scales.
- X. Either involucre-bracts or else rays not as below; akenes usually flat.
- Y. Involucre-bracts in more than 2 indistinct whorls, rays unequal, wider than filiform, in 1 whorl; pappus in 1 whorl. *ASTER* (p. 383)
- YY. Involucre-bracts in 1—2 indistinct whorls, usually nearly equal; rays mostly filiform, in 1 or more whorls; pappus in 1—2 whorls, the outer whorl often of scales or shorter bristles. *ERIGERON* (p. 388)
- XX. Involucre-bracts white, green-tipped; rays about 5, white; akenes not or hardly flattish. *SERICOCARPUS* (p. 390)

GRINDELIA

GUM-WEED

Herbs or shrubby at base, biennial or perennial, often gummy specially on the involucre, coarse. Leaves alternate, entire or serrate; stem-leaves sessile to clasping. Heads radiate or rayless, medium or large, many-flowered, terminal on the branches; involucre hemispheric or globose, bracts imbricated in several series; receptacle flat, somewhat pitted. Ray-flowers none or else in 1 series: corolla yellow, ligulate. Disk-flowers perfect; corolla tubular-funnelform, 5-lobed, yellow. Akenes obovate or oval, glabrous, somewhat angled. Pappus of 2—8 nearly smooth and easily separating awns or bristles. (Honor of D. H. Grindel, a Russian botanist.)

- A. Stem-leaves widest at their base, acute or acuminate; heads radiate, more than 15 mm. high. W. *G. integrifolia* DC.
- AA. Stem-leaves narrowed at their base, obtuse in most.
- B. Heads more than 15 mm. high, radiate; plant glabrous or sparingly hirsute. W. (*G. hendersoni*.) *G. oregana* Gray
- BB. Heads 10—15 mm. high, radiate or rayless; plant glabrous thruout or slightly chaffy.
- C. Heads radiate. W. C. E. (*G. brownii*.) *G. nana* Nutt.
- CC. Heads rayless. E. *G. nana columbiana* Pip.

GUTIERREZIA

BROWN-WEED

Herbs or shrubs, perennial, erect, branching, nearly glabrous, resinous. Leaves alternate, linear to lanceolate, entire. Heads radiate, small, in cymes or panicles; involucre ovoid or campanulate, bracts coriaceous, imbricated in a few series; receptacle flat or convex or conic, usually pitted. Ray-flowers 1—10 (ours), pistillate: corolla yellow. Disk-flowers 1—10 (ours), yellow, perfect or some staminate: corolla yellow, 5-lobed. Anthers not tailed at base. Akenes terete or ribbed or 5-angled. Pappus of 4—14 scales. (Honor of the Gutierrez family of the Spanish nobility.)

A. Leaves narrowly linear; rays 1—2; disk-flowers 1—2. E.

G. microcephala Gray

AA. Lower leaves often wider, the upper linear; rays 3—10; disk-flowers 3—10. E.
(*G. diversifolia*.) *G. sarothrae* B. & R.

CHRYSOPSIS

GOLDEN ASTER

Herbs, perennial, branching. Leaves alternate, sessile, entire or dentate. Heads radiate or rayless, medium or large, many-flowered, in loose corymbs, or solitary at the ends of the branches; involucre hemispheric or campanulate; bracts narrow, imbricated in several series, the outer shorter; receptacle flat, somewhat pitted. Ray-flowers none or pistillate: corolla yellow. Disk-flowers mostly perfect: corolla yellow, 5-toothed. Pappus in 2 whorls, the inner of many rough capillary bristles, the outer of small or minute scales or bristles. Akenes flattish, obovate or oblong, linear. (Gk. chrysos=gold, opsis=like; referring to its golden-yellow flowers.)

A. Heads radiate.

B. Leaves canescent. W. E. *C. villosa* Nutt. (Hairy Golden Aster)

BB. Leaves green. E. *C. hispida* Nutt. (Rough Golden Aster)

AA. Heads rayless. W. E. (*Ammodia oregana*.)

C. oregana Gray (Rayless Golden Aster)

SOLIDAGO

GOLDEN-ROD

Herbs but sometimes woody at base, perennial, erect. Leaves alternate, simple, entire to serrate, often 3-veined from near base. Heads radiate, small, few- to several-flowered, in clusters; clusters terminal, various in form; involucre oblong or narrowly campanulate; bracts imbricated in several series, the outer shorter; receptacle flat or slightly convex, honey-comb-like or fringed or pilose. Ray-flower pistillate, yellow. Disk-flowers mostly all perfect; corolla yellow, 5-lobed. Akenes terete or angled, usually 5—10-ribbed, often hairy. Pappus of capillary bristles; bristles many, rough, nearly equal, in 1—2 series. (L. solidare—to make whole; on account of the reputed vulnerary properties.)

A. Rays fewer than the disk-flowers; receptacle somewhat honey-combed; inflorescence not flat-topped.

B. Branches of the panicle raceme-like.

C. Plant glabrous or nearly so below the inflorescence; leaves much serrate to entire, acute or acuminate; heads 4—7 mm. long.

D. Involucre-bracts linear-subulate; leaves sparingly serrate, thin; heads 4—5 mm. high.

E. Bracts of the panicle leaf-like. C. E.

S. caurina Pip.

EE. Bracts of the panicle not leaf-like. W. C. E.

S. elongata Nutt.

- DD. Involucre-bracts obtuse or merely acutish, not subulate; leaves often sharply and much serrate.
- F. Leaves entire or nearly so; heads 4—6 mm. high; leaves thick, firm (as in Willows).
- G. Branches of the panicle not 1-sided, not recurved; involucre-bracts acutish, thin; leaf-margin mostly scabrous-ciliate. W. E.
S. tolmieana Gray
- GG. Branches of the panicle 1-sided, recurved; involucre-bracts obtuse, thick; leaf-margin not ciliate. E.
S. missouriensis Nutt.
- FF. Leaves sharply and distinctly serrate; heads 5—7 mm. high; leaves thin (as in Dandelion); raceme 1-sided, recurved.
- H. Leaves smooth on both sides. E.
S. serotina Ait.
- HH. Leaves harshly rough on both sides. W. E.
S. serotina salebrosa Pip.
- CC. Plant puberulent to pubescent; leaves entire except the lower, obtuse or apiculate; heads 6—8 mm. long; involucre-bracts obtuse. U. E.
S. californica Nutt.
- BB. Branches of the panicle not raceme-like.
- I. Involucre-bracts acute or acuminate. W. C. E. (*S. hesperia*).
S. corymbosa Nutt.
- II. Involucre-bracts obtuse.
- J. Leaves mostly obovate or spatulate and entire. E.
S. nana Nutt.
- JJ. Leaves oblanceolate or oblong to linear, distinctly serrate or crenate at least near the tip.
- K. Panicle raceme-like, loose. W.
S. purshii Port.
- KK. Panicle branched, dense. W. (*S. confertifolia*).
S. glutinosa Nutt.
- AA. Rays more numerous than the disk-flowers; receptacle somewhat fringed; inflorescence flat-topped; leaves linear, entire, smooth, 3-veined. W. E. (*Euthamia occidentalis*).
S. occidentalis T. & G.

APLOPAPPUS (Haplopappus)

Herbs or shrubs but mostly herbs with woody base, perennial (ours), low, often viscid, often hairy. Leaves alternate, rigid, entire or dentate. Head radiate or rayless, 8—20 mm. high (ours), yellow, few or many-flowered, all alike, either terminal on the stem or branches, or else on axillary peduncles, rarely sessile; involucre hemispheric or widely campanulate; bracts in 2 to many series, 0—1-veined; receptacle flat or nearly so, pitted. Ray-flowers 0—25; corolla yellow. Disk-flowers perfect: corolla 5-toothed, yellow. Akene glabrous or hairy. Pappus of bristles; bristles many, white or brownish or reddish, unequal, mostly in more than 1 whorl, simple to barbellate or sometimes nearly plumose. (Gk. aploos=simple, pappos=pappus; the pappus is not plumose.)

- A. Heads rayless.
- B. Leaves with spinulose-tipped teeth.
- C. Akenes densely hairy; pappus white. SIDERANTHAE (p. 380)
- CC. Akenes glabrous, smooth; pappus brownish. PYRROCOMAE (p. 380)
- BB. Leaves without spinulose-tipped teeth; akene pubescent. MACRONEMAE (p. 381)

- AA. Heads radiate.
 D. Stem glabrous.
 E. Involucre-bracts somewhat foliaceous; leaf-teeth spinulose-tipped or none. PYRROCOMAE (p. 380)
 EE. Involucre-bracts papery, not foliaceous; leaf-teeth not spinulose-tipped or none.
 F. Heads not in corymbs, many-flowered; akenes densely hairy. STENOTAE (p. 381)
 FF. Heads in corymbs, few- to several-flowered; akenes glabrous. PETRADORAE (p. 382)
 DD. Stem hairy.
 G. Involucre-bracts foliaceous at least at tip.
 H. Leaves coriaceous; involucre-bracts veinless; ray-flower 0—25. PYRROCOMAE (p. 380)
 HH. Leaves herbaceous; involucre-bracts 1-veined.
 I. Ray-flowers 2—9; leaves sessile; pappus tawny to reddish; plant not viscid nor glandular. MACRONEMAE (p. 381)
 II. Ray-flowers 15—20; leaves petioled; pappus white; plant viscid or glandular. TONESTAE (p. 381)
 GG. Involucre-bracts papery at least at margin and tip, not foliaceous, 1-veined; plants viscid or glandular; ray-flowers 8—12. STENOTAE (p. 381)
- Subgenus SIDERANTHAE—Finely pubescent (ours); stems simple, 1—3 dm. high (ours). Leaves with spinulose-tipped teeth. Heads rayless, many-flowered; tips of all the involucre-bracts somewhat spreading, green, abrupt. Akenes densely silky. Pappus white; bristles barbellate.
- A. Plant glandular-pubescent; leaves obovate to oblanceolate; pappus-hairs scabrous.
 E. (*Macronema aberrans*.) A. *aberrans* (Nels.)
- AA. Plant white-tomentose but not glandular; leaves oblanceolate to lanceolate; pappus-hairs barbellate. E. (*Eriocarpum grindelioides*.)
 A. *grindelioides* Brit.
- Subgenus PYRROCOMAE—Glabrous to tomentose; stems mostly simple, 1—8 dm. high (ours). Leaves entire or with spinulose-tipped teeth. Heads radiate or rayless, many-flowered; involucre-bracts veinless, somewhat foliaceous; tips somewhat spreading. Ray-flowers 0—25 (ours). Akenes glabrous or hairy. Pappus dull-yellow or brown or reddish; bristles scabrous to almost plumose.
- A. Rays none or inconspicuous.
 B. Akenes glabrous; rays either none or hardly exceeding the pappus. E. (*Pyrrocoma carthamoides*; *Hoorebekia carthamoides*; *Pyrrocoma cusickii*; *Hoorebekia cathamoides cusickii*.) A. *carthamoides* Gray
 BB. Akenes sparsely hirsute; rays present, plainly exceeding the pappus but inconspicuous. E. (*Pyrrocoma racemosa*; *Hoorebekia racemosa*; *Pyrrocoma radiata*.)
 A. *racemosus* Torr.
- AA. Rays conspicuous.
 C. Plant glabrous except sometimes in the inflorescence.
 D. Leaves oblong-lanceolate to spatulate, entire to distinctly serrate. E. (*Pyrrocoma glomerata*; *Pyrrocoma arguta*; *Pyrrocoma paniculata*.)
 A. *paniculatus* Gray
 DD. Leaves lanceolate to linear, entire. U. E. (*Pyrrocoma congesta*; *Pyrrocoma hallii*; *Hoorebekia hallii*.)
 A. *hallii* Gray

CC. Plant somewhat hairy.

E. Leaves herbaceous; involucre-bracts linear. E. (*Pyrocoma hirta*; *Hoorebekia hirta*; *Pyrocoma howellii*.)

A. *hirtus* Gray

EE. Leaves coriaceous or rather rigid; involucre-bracts lanceolate or oblong.

F. Stems not markedly slender; involucre-bracts lanceolate.

G. Radical and lower stem-leaves lanceolate. E. (*Pyrocoma lanceolata*.)

A. *lanceolatus* T. & G.

GG. Radical and lower stem-leaves oblanceolate. E.

A. *insecticruris* Hend.

FF. Stems markedly slender; involucre-bracts broadly-oblong. E. (*Pyrocoma tenuicaulis*.) A. *tenuicaulis* Eat.

Subgenus MACRONEMAE—Puberulent to tomentose, much branched. Leaves entire, sessile. Heads radiate or rayless, many-flowered; involucre-bracts 1-veined, outer with foliaceous and spreading tips. Ray-flowers 0—9 (ours). Akenes pubescent (ours). Pappus tawny or brown or reddish.

A. Rays none; flowers about 25; plant white-tomentose; leaves obtuse. E. (*Macronema discoideum*.) A. *discoideus* (Nutt.)

AA. Rays 2—9; disk-flowers 10—16.

B. Leaves obtuse or mucronate; heads 10—14 mm. high; disk-flowers 10—16; plant puberulent to white-tomentose. E. (*Macronema greenei*; *Hoorebekia greenei mollis*; *macronema mollis*.)

A. *greenei* Gray

BB. Leaves acute; heads 16—20 mm. high; disk-flowers 20—30; plant puberulent. E. (*Macronema suffruticosa*.)

A. *suffruticosus* Gray

Subgenus STENOTAE—Tomentose to nearly glabrous; stems simple, 0.2—3 dm. high (ours). Leaves entire, 1—3-veined. Heads radiate, many-flowered, not in corymbs; involucre-bracts 1-veined, papery at least at margin and tip; tips closely appressed. Ray-flowers 8—12. Akenes densely silky-villous. Pappus white or darker; bristles scabrous.

A. Herbaceous; involucre woolly. E. (*Stenotus lanuginosus*; *Hoorebekia lanuginosa*.)

A. *lanuginosus* Gray

AA. Shrubby at least at base; involucre pubescent to glabrous.

B. Leaves 1-veined, linear-spatulate to filiform. E. (*Stenotus stenophyllus*; *Hoorebekia stenophylla*.) A. *stenophyllus* Gray

BB. Most of the leaves 3-veined below, lower leaves spatulate or wider.

C. Plant scabrous-pubescent. E. (*Stenotus acaulis*.)

A. *acaulis* Gray

CC. Plant glabrous. E. (*Stenotus caespitosus*.)

A. *caespitosus* (Nutt.)

Subgenus TONESTAE—Puberulent; stems simple, 1—3 dm. high (ours). Leaves entire, petioled. Heads radiate, many-flowered; involucre-bracts 1-veined, the outermost somewhat foliaceous and spreading at tip. Ray-flowers 15—20. Akenes glabrous or slightly pubescent (ours). Pappus white; bristles scabrous. W. C. (*Stenotus lyallii*; *Hoorebekia lyallii*; *Tonestus lyallii*; *A. laceratus*.)

A. *lyallii* Gray

Subgenus PETRADORAE—Glabrous; stems simple, 1—2 dm. high (ours). Leaves entire, 3-veined. Heads radiate, few to several-flowered, in corymbs; involucre-bracts with small green tips, rigid, erect, somewhat keeled. Ray-flowers few. Akenes glabrous. E. (*Petradoria pumila*.)

A. *pumila* Nutt.

ERICAMERIA

FALSE HEATHER

Herbs or shrubby plants (ours), perennial, glabrous, somewhat viscid; ours 5—20 cm. high, much branched. Leaves alternate, sessile; in ours spatulate to filiform, 6—25 mm. long, entire, many. Heads radiate, about 1 cm. high (ours), several-flowered, in corymbs; involucre narrowly campanulate to oblong; bracts imbricated in several series, acute or acuminate (ours), lanceolate, with scarious margins; receptacle flat, pitted. Ray-flowers 4—6: corolla yellow. Disk-flowers 8—12: corolla yellow. Akenes cylindric, hairy when young. (*Erica* is a genus of heather, Gk. meros=a part; because the leaves are heather-like.) E. (*Chrysothamnus resinosus*; *Chrysothamnus nanus*.)

E. *nana* Nutt.

CHRYSOTHAMNUS

RABBIT-BRUSH

Herbs or shrubby plants, perennial, glabrous to white-tomentose, often viscid. Leaves alternate, oblong or narrower, entire or merely scabrous, sessile, 3-veined (ours). Heads rayless or rarely radiate, in racemes or panicles or cymes, involucre campanulate to oblong; bracts 3—5 sometimes indistinct vertical rows, coriaceous, mostly scarious but sometimes partly green; receptacle flat, pitted. Ray-flowers none except in *C. bloomeri*; corolla yellow. Disk-flowers 5—30: corolla yellow. Akenes narrow, terete or slightly angled, pubescent (ours). Pappus-bristles capillary, usually dull-white. (Gk. chrysos=gold, thamnus=a shrub; shrubby plants with yellow flowers.)

A. Branches glabrous; leaves glabrous tho often viscid.

B. Involucre-bracts attenuate, acute, the outer abruptly narrowed to a subulate green tip; plant 3—6 dm. high; rays 0—4. E.

C. *bloomeri* Gr.

BB. Involucre-bracts obtuse to acutish, the outer not with a subulate green tip; rays 0.

C. Heads few; plant 1—3 dm. high; leaves often inrolled. E.

C. *pumilus* Nutt.

CC. Heads many; plant 5—20 dm. high; leaves flat. E.

C. *viscidiflorus* Nutt.

AA. Branches puberulent to tomentose; rays 0.

D. Branches ashy-pubescent; plant 1—4 dm. high. E. (*C. lanceolatus*; *C. puberulus*.)

C. *viscidiflorus lanceolatus* Gr.

DD. Branches white-tomentose; plants 4—15 dm. high.

E. Plant narrow with somewhat erect branches; leaves minutely white tomentose; outer involucre-bracts tomentose on the back. E. (*C. speciosus albicaulis*.)

C. *nauseous* Brit. (Fetid Rabbit-brush)

EE. Plant wide with mostly spreading branches; leaves glabrous; outer involucre-bracts glabrous. E. (*C. speciosus*; *C. graveolens*.)

C. *nauseous graveolens* Pip.

BELLIS

DAISY

Herbs, tufted; ours perennial, acaulescent. Leaves alternate, all basal, entire or obscurely dentate; in ours pubescent, spatulate. Heads radiate, terminal on scapes,

many-flowered; involucre hemispheric or broadly campanulate; bracts herbaceous, in 1—2 series, usually purple (ours), nearly equal; receptacle convex or conic, naked. Ray-flowers white or pink or purple. Disk-flowers perfect; corolla yellow, 4—5-toothed. Akenes flat, veined near the margin. Pappus either none or a ring of minute bristles. (L. bellus=pretty; referring to the flowers.) W.

B. perennis L. (Garden Daisy)

BOLTONIA

Herbs, perennial, branching, glabrous, 6—18 dm. high (ours). Leaves alternate, sessile or clasping, entire; in ours broadly lanceolate to linear-lanceolate. Heads many, radiate, many-flowered, in panicles or solitary at the branch-ends; involucre hemispheric or broadly campanulate; bracts scarious-margined, in a few series, the outer slightly shorter; receptacle convex or conic, honey-combed. Ray-flowers in ours white, 8—10 mm. long. Disk-flowers perfect: corolla 5-lobed. Akenes flat, obovate, glabrous or nearly so, ridged at margin. Pappus a series of short scales with 2 (ours) slender rigid bristles among them. (Honor of J. Bolton, an English botanist.) E.

B. occidentalis How.

TOWNSENDIA

TOWNSENDIA

Herbs, often acaulescent. Leaves alternate, linear to spatulate, entire. Heads radiate, white or pink or purple, large, all alike, many-flowered; involucre hemispheric or somewhat globose; bracts lanceolate, numerous, imbricated, appressed, in several series, scarious-margined, lacerate-fringed, often colored; receptacle flat, wide, reticulate. Ray-flowers rather long, sometimes sterile, white or pink or purple. Disk-flowers perfect: corolla 5-toothed. Akenes flat, obovate or oblong, pubescent or glabrous, 2—3-veined. Pappus of stout bristles; bristles barbellate, in 1 series; pappus of the ray-flowers sometimes mere scales. (Honor of D. Townsend, an American botanist.)

A. Plant stemless, the stem at least not over 2 cm. long.

B. Leaves ~~ashy~~ pubescent; involucre-bracts between acute and acuminate. E.

T. alpina Rydb. (Gray Townsendia)

BB. Leaves green but somewhat strigose; involucre-bracts between acute and obtuse.

E. *T. dejecta* Nels.

AA. Plant leafy-stemmed, the stem 2—40 cm. high.

C. Inner involucre-bracts acuminate.

D. Leaves mostly spatulate; stems naked above. E.

T. parryi Eat.

DD. Leaves mostly linear; stems leafy even above. E.

T. florifer Gray

CC. Inner involucre-bracts merely acute or obtuse.

E. Plant without woody base, annual or biennial. E.

T. watsonii Gray

EE. Plant with woody base, perennial.

F. Rays white to lilac. E.

T. incana Nutt.

FF. Rays dark blue. E.

T. alpigena Pip.

ASTER

ASTER

Herbs, stems leafy in most. Leaves alternate, entire to somewhat pinnatifid. Heads radiate or rayless, many-flowered, solitary or in panicles or corymbs; involucre-bracts in

several series, tips often herbaceous or foliaceous; receptacle flat or convex. Ray-flowers none or not yellow, in 1 series. Disk-flowers yellow, often changing to purple, perfect. Pappus of capillary bristles; bristles many, in 1 whorl (or 2 in IONACTAE), often unequal, scabrous or barbellate. Akenes usually flattish, glabrous or hairy. (Gk. aster = a star; referring to the radiate heads of most species.)

A. Plants acaulescent, 0.5—4 dm. high, perennial; leaves all basal and entire, narrowly spatulate to subulate, grass-like, 2.5—25 cm. long.

OREASTRAE (p. 384)

AA. Plants leafy-stemmed, mostly taller, often annual or biennial; leaves often not entire, often wider, not grass-like.

B. Involucre-bracts in more than 5 series, their tips spreading; rays none or blue or purple; leaf-lobes or teeth mucronate or bristle-tipped or none.

MACHAERANTHRAE (p. 384)

BB. Involucre-bracts in 1—5 series, their tips erect or spreading; leaf-lobes or teeth not mucronate nor bristle-tipped, often none.

C. Plants 0.5—3 dm. high, perennial, alpine; leaves 5—25 mm. long, linear or linear-oblong, entire or serrulate-scabrous; rays violet; involucre-bracts not herbaceous-tipped.

IONACTAE (p. 385)

CC. Plants mostly taller; leaves mostly longer, often wider; involucre-bracts herbaceous or purple-tipped.

D. Involucre-bracts dry, chaffy, closely appressed, often purple-tipped, the mid-vein keeled or prominent.

EUCEPHALAE (p. 385)

DD. Involucre-bracts green at least at the tip, often spreading at tip, the mid-vein neither keeled nor prominent.

E. Rays in more than 1 series, about 2 mm. long; leaves linear-spatulate, entire, 25 mm. or less long; plant annual.

BRACHYACTAE (p. 386)

EE. Rays in 1 series, more than 2 mm. long; leaves various; plant perennial.

EUASTERAE (p. 386)

Subgenus OREASTRAE—Perennial; scapes somewhat bracted, in ours 35 cm. or less high and simple. Leaves all basal, entire; in ours spatulate or narrower, grass-like, 2.5—25 cm. long. Heads radiate, solitary; involucre-bracts linear (ours), nearly equal, in about 2 series. Ray-flowers purple, 1—2 cm. long (ours). Akene hardly flattish, distinctly 5—8-ribbed, somewhat hairy (ours). Pappus brownish, barbellate, deciduous.

A. Plant 5—10 cm. high; leaves veinless, obtuse, 2.5—7.5 cm. long; akenes glabrous below, hirsute near tip. C. E. (*Oreastrum alpigenum*.)

A. alpigenus Gray

AA. Plant 20—35 cm. high; leaves 1-veined, acute, 5—25 cm. long; akenes villous. U. C. (*Oreastrum andersoni*.)

A. andersoni Gray

Subgenus MACHAERANTHERAE—Ours biennial or perennial; stems leafy, branched. Leaves entire to pinnatifid; teeth or lobes bristle-tipped. Heads radiate or rayless, large; involucre-bracts canescent or glandular, linear, rigid, somewhat keeled; their tips herbaceous, spreading or recurved. Akene turbinate or wedge-shaped, often flat, pubescent or silky, few-veined on the faces. Pappus scabrous.

A. Heads rayless. U. (*Machaeranthera eradiata*.)

A. eradiatus (Gray)

AA. Heads radiate.

B. Inner involucre-bracts not bristle-tipped.

- C. Stem branched from the base, 1—2 dm. high.
- D. Plant tomentose; heads 10—12 mm. high. E. (*Machaeranthera shastensis*.) A. *shastensis* Gray
- DD. Plant puberulent; heads 6—8 mm. high. E. A. *glossophyllus* Pip.
- CC. Stem unbranched below, branched above, 5—10 dm. high.
- E. Most of the involucre-bracts erect. E. (*Machaeranthera canescens*.) A. *canescens* Pursh
- EE. Most of the involucre-bracts reflexed. E. (*Machaeranthera viscosa*; *Machaeranthera canescens viscosa*; apparently *Machaeranthera magna*.) A. *canescens viscosus* Gray
- BB. Inner involucre-bracts attenuate into a slender bristle. E. (*Machaeranthera attenuata*.) A. *attenuatus* (How.)

Subgenus IONACTAE—Perennial, tufted, ours 25 cm. or less high; stems simple to the inflorescence, leafy. Leaves rigid, 0—1-veined; in ours 2—25 mm. long, linear-oblong or narrower. Heads radiate, showy, 1 or more on a stem; involucre-bracts unequal, coriaceous, linear (ours); tips not herbaceous, appressed. Ray-flowers violet. Akenes narrow, villous, flat (ours). Pappus of 2 whorls; inner whorl of many bristles; outer whorl of short hair-like bristles.

- A. Plant tomentose-pubescent, 7—10 cm. high; leaves 8—12 mm. long. E. (*Ionactis alpina*.) A. *scropulorum* Gray
- AA. Plant merely somewhat scabrous, 15—25 cm. high; leaves 12—25 mm. long. E. (*Ionactis stenomeres*.) A. *stenomeres* Gray

Subgenus EUCEPHALAE—Perennial; stems very leafy. Lower leaves the smallest. Heads rayless or radiate, solitary or in panicles; involucre-bracts in 3—4 series, imbricated, dry, scarious, linear to ovate, concave, somewhat keeled, the outer shorter, often purple at tip. Akenes oblong, flattened, villous. Pappus longer than the corolla.

- A. Rays none or rarely 1—2. U. (*Eucephalus tomentellus*; *Eucephalus glabratus*.) A. *tomentellus* (Gr.)
- AA. Rays 5 or more.
- B. Leaves somewhat tomentose beneath. C. E. (*Eucephalus ledophyllus*; *Eucephalus convillei*.) A. *ledophyllus* (Gray)
- BB. Leaves not tomentose beneath, glabrous or puberulent.
- C. Rays purple or violet; plant puberulent.
- D. Involucre-bracts conspicuously woolly-ciliate. E. (*Eucephalus elegans*.) A. *elegans* T. & G.
- DD. Involucre-bracts not woolly-ciliate. W. (*Eucephalus paucicapitatus*.) A. *paucicapitatus* Rob.
- CC. Rays white or pinkish; plant glabrous or rarely puberulent.
- E. Leaves glaucous, broadly lanceolate. C. E. (*Eucephalus glaucescens*; *Eucephalus glaucophyllus*.) A. *glaucophyllus* (Pip.)
- EE. Leaves green, not glaucous.
- F. Leaves broadly lanceolate; involucre-bracts partly herbaceous. C. E. (*Eucephalus engelmannii*.) A. *engelmannii* Gray
- FF. Leaves narrowly lanceolate; involucre-bracts almost wholly herbaceous. (*Eucephalus serrulatus*.) A. *serrulatus* (Gr.)

Subgenus BRACHYACTAE—Ours annual, 4 dm. or less high; stems leafy. Leaves in ours entire, linear, 5 cm. or less long. Heads radiate, racemose-paniculate (ours), conspicuous; involucre-bracts in few series, loosely imbricated, herbaceous or the inner scarious. Akenes somewhat flat. E. (*Brachyactis frondosa*.)

A. frondosus T. & G.

Subgenus EUASTERAE—Annual or perennial; stems leafy. Leaves entire or serrate, linear to ovate or obovate. Heads radiate, in panicles or corymbs, small or large; involucre-bracts somewhat herbaceous in most species. Akenes usually flat, glabrous or pubescent. Pappus scabrous, dull white.

- A. Involucre viscid or glandular.
 - B. Leaves coriaceous, oblong or wider, sharply serrate, rough to the touch.
 - C. Involucre campanulate, obscurely glandular, its bracts acute. E.
 - A. radulinus Gray
 - CC. Involucre turbinate, plainly glandular, its bracts obtuse. E.
 - A. conspicuus Lindl.
 - BB. Leaves membranous, oblong or narrower, often indistinctly serrate, not rough to the touch.
 - D. Heads less than 1 cm. wide; rays 6—8 mm. long; leaves linear. E. (A.
 - DD. Heads 1.5—3 cm. wide; rays 10—15 mm. long; leaves mostly wider.
 - E. Leaves entire or repand-denticulate; involucre-bracts closely imbricated, rigid. C. E.
 - A. integrifolius Nutt.
 - EE. Leaves sparingly but sharply serrate; involucre-bracts loose, not rigid.
 - W. C. E. (A. major.)
 - A. modestus Lindl.
 - AA. Involucre not viscid nor glandular.
 - F. Heads more than 1 cm. wide.
 - G. Leaf-faces not glabrous, scabrous or puberulent or pubescent or tomentose.
 - H. Rays white. E. A. commutatus Gray
 - HH. Rays not white, pink to purple.
 - I. Involucre-bracts closely appressed, their larger portion coriaceous.
 - J. Rough-pubescent; leaves coriaceous, sharply serrate. E.
 - A. radulinus Gray
 - JJ. Smooth-pubescent or puberulent; leaves herbaceous, entire at least in the upper half of the plant.
 - K. Plant 3—6 dm. high, involucre-bracts soft-pubescent. E.
 - A. jessicae Pip.
 - KK. Plant 9—15 dm. high; involucre-bracts not pubescent. U. E.
 - A. menziesii Lindl.
 - II. Involucre-bracts loose, their larger portion herbaceous.
 - L. Outer involucre bracts as large as the inner.
 - M. Upper leaves deeply cordate-clasping, hardly smaller than the lower; akenes glabrous. E. (S. cusickii lyallii.)
 - A. cusickii Gray
 - MM. Upper leaves not cordate-clasping, distinctly smaller than the lower; akenes canescent. E.
 - A. wattii Pip.
 - LL. Outer involucre-bracts shorter than the inner; stem-leaves not cordate-clasping. U. A. militarius Gr.
 - GG. Leaf-faces glabrous or nearly so, but the margin often hairy.

- N. Bracts of the involucre equal or nearly so, not distinctly shorter outward.
- O. Involucre-bracts closely appressed, their larger portion coriaceous. E.
A. elmeri Pip.
- OO. Involucre-bracts loose, their larger portion herbaceous.
- P. Stem-leaves clasping or auriculate, scarcely reduced upward on the stem, few. C. E. (*A. canbyi*; *A. foliaceus apricus*; *A. apricus*; *A. frondeus*; *A. burkei*; *A. foliaceus frondeus*.)
A. foliaceus Lindl.
- PP. Stem-leaves sessile but not auriculate nor clasping, either small or else reduced upward on the stem, many.
- Q. At least the outer involucre-bracts leaf-like and merging into the leaves.
- R. Leaves entire. E.
A. eatoni How.
- RR. Most of the leaves serrate near their middle. E.
A. douglasii Lindl.
- QQ. Involucre-bracts not at all leaf-like; leaves all entire.
- S. None of the involucre-bracts recurved. E.
A. hendersoni Fer.
- SS. Some of the involucre-bracts recurved. E.
A. proximus Gr.
- NN. Bracts of the involucre plainly unequal, shorter outward.
- T. Involucre-bracts closely appressed, their greater portion coriaceous; leaves entire. E. (*A. geyeri*.)
A. laevis geyeri Gray
- TT. Involucre-bracts loose, their greater portion herbaceous.
- U. Stem-leaves auriculate or clasping, scarcely reduced upward on the stem, few. (See P.)
- UU. Stem leaves sessile but not auriculate nor clasping (except possibly *A. fremonti*), either small or else reduced upward on the stem, many.
- V. Some of the involucre-bracts recurved. (See QQ.)
- VV. All of the involucre-bracts erect or ascending, not recurved.
- W. Involucre-bracts lanceolate or linear, their tips acute in most.
- X. Most of the leaves linear, serrulate. C. E. (*A. occidentalis intermedius*.) *A. occidentalis* Nutt.
- XX. Most of the leaves lanceolate or still wider.
- Y. Leaves not at all clasping at base, entire or serrulate. E.
A. meritus Nels.
- YY. Leaves half-clasping at base, entire. C. E.
A. fremonti Gray
- WW. Involucre-bracts spatulate, their tips rounded. U.
A. chamissonis Gray
- FF. Heads less than 1 cm. wide; leaves entire.
- Z. Rays purple or clear blue; involucre turbinate. E. (Apparently *A. cordalenus*.)
A. amethystinus Nutt. (Amethyst Aster)
- ZZ. Rays usually white; involucre campanulate.
- a. Involucre-bracts obtuse or mucronate.
- b. Plant rough-pubescent or scabrous; involucre-bracts pubescent. E.
A. multiflorus Ait. (Wreath Aster)
- bb. Plant not rough tho somewhat pubescent; involucre-bracts glabrous. W.
E.
A. hallii Gray
- aa. Involucre-bracts acute. E. *A. oreganus* Nutt.

ERIGERON

FLEA-BANE

Herbs but often shrubby at base, annual or biennial or perennial. Leaves entire to dissected. Heads 1—many, radiate or rayless, many-flowered, corymbose or cymose or paniculate; involucre-bracts usually equal, narrow, in 1—2 series; receptacle flat, punctate. Ray-flowers none or usually many, usually in more than 1 series, various in color. Disk-flowers mostly perfect. Akenes somewhat flat, usually pubescent, often with 2 lateral veins. Pappus of bristles; bristles scabrous, capillary, in 1 or 2 whorls; single whorl or inner whorl of scabrous capillary bristles; outer whorl of minute bristles or small awn-tipped scales. (Gk. er=spring, geron=an old man; some early species are very hoary.)

A. Rays conspicuous, much surpassing the disk-flowers.

B. Rays yellow.

C. Leaves spatulate to obovate; heads solitary.

D. Stem 4—10 cm. high.

E. Leaves 2.5—7.5 cm. long. E.

E. chrysopsidis Gray

EE. Leaves 1—1.5 cm. long. E.

E. chrysopsidis brevifolius Pfp.

DD. Stems 20—30 cm. high; leaves 1.2—1.6 cm. long. C. E. (*Stenotus brandegei*.)

E. aurens Gr.

CC. Leaves linear; heads 1 to several.

F. Involucre-bracts equal; rays ochroleucous. E.

E. ochroleucus Nutt.

FF. Involucre-bracts unequal; rays yellow.

G. Leaves hispidulous, curved; rays pale yellow. E. (*E. curvifolius*.)

E. luteus Nels.

GG. Leaves canescent-puberulent, straight; rays bright-yellow. E. (*E. peucephyllus*.)

E. filifolius Nutt.

BB. Rays not yellow.

H. Leaves entire to serrate or dentate.

I. Stems simple below tho often branched above, solitary.

J. Rays 100—150.

K. Leaves entire; involucre somewhat hirsute; stem from a woody perennial base.

L. Herbage glabrous or very nearly so; heads 1.5—2 cm. wide. W.

C. E. *E. speciosus* DC. (Pretty Flea-bane)

LL. Herbage plainly pubescent; heads 2.5—3.5 cm. wide. E.

E. subtrinervis Rydb. (3-veined Flea-bane)

KK. Leaves dentate; involucre glabrous; stem not woody at base, perennial by stolons. W. C. E.

E. philadelphicus L. (Philadelphia Flea-bane)

JJ. Rays 20—70.

M. Involucre viscid or glandular.

N. Upper leaves ovate-oblong to lanceolate; involucre 12—16 mm. wide. C. E. (*E. membranous*; *E. saluginosus angustifolius*.)

E. saluginosus Gray

NN. Upper leaves oblanceolate to spatulate; involucre 6—8 mm. wide. U. E. *cervinus* Gr.

MM. Involucre not viscid nor glandular.

O. Heads solitary or few; perennial; pappus a single whorl of bristles.

P. Rays 50—60, sometimes white. W. (*E. amplifolius*.)

E. aliciae How.

- PP. Rays 20—35, never white.
- Q. Rays purple or violet, 20—30; leaves tomentose to glabrate.
C. E. *E. peregrinus* Gr.
- QQ. Rays white, 30—35; leaves glabrous. W.
E. howellii Gray
- OO. Heads numerous; annual or biennial; pappus an inner whorl of bristles and an outer whorl of scales.
- R. Stem with spreading hairs; leaves coarsely and sharply toothed; involucre bristly. E.
E. annuus Pers. (Sweet Scabious)
- RR. Stem with appressed hairs or almost glabrous; leaves entire or nearly so; involucre minutely hairy. C. E.
E. ramosus P. S. B. (Daisy Flea-bane)
- II. Stems either branched near the base or somewhat tufted.
- S. Blades of the basal leaves spatulate or oblanceolate or obovate.
- T. Involucre glandular or frosted-glandular.
- U. Rays 30—40. C. (*E. spathulifolius*.) *E. leiomeris* Gray
- UU. Rays 60—70. E. *E. leibergii* Pip.
- TT. Involucre not glandular.
- V. Rays 20—75.
- W. Stems with only 1 head.
- X. Involucre with long white hairs. C. *E. lanatus* Hook.
- XX. Involucre without long white hairs altho often pubescent.
bescent.
- Y. Basal leaves broadly obovate-spatulate; rays white. E.
E. tener Gray
- YY. Basal leaves spatulate to linear; rays rarely white.
- Z. Basal leaves 3-veined. E. *E. corymbosus* Nutt.
- ZZ. Leaves 1-veined.
- a. Stems branched above. W. E.
E. decumbens Nutt.
- aa. Stems simple. U. *E. confinis* How.
- WW. Stems with more than 1 head.
- b. Involucre white-woolly. C. (*E. grandiflorus* for our region.)
E. uniflorus L. (Arctic Flea-bane)
- bb. Involucre merely pubescent or hirsute, not woolly.
- c. Leaves coarsely toothed to nearly entire. W.
E. oreganus Gray
- cc. Leaves entire.
- d. Herbage conspicuously hispid-ciliate.
- e. Heads 12—20 mm. wide; involucre-bracts acute; rays 50—80. E. *E. pumilus* Nutt.
- ee. Heads 20—25 mm. wide; involucre-bracts long-acuminate; rays 20—50. E. *E. poliospermus* Gray
- dd. Herbage not hispid-ciliate, hairs short and appressed.
- f. Pappus of a single whorl of bristles.
- g. Rays 4—6 mm. long; involucre 5—6 mm. high. E.
E. radicans Hook.
- gg. Rays 12—20 mm. long; involucre 6—8 mm. high.
(See aa.)
- ff. Pappus double, the outer whorl of very short bristles; rays 6—12 mm. long. E. *E. caespitosus* Nutt.
- VV. Rays 80—120.

- h. Annual; heads many; pappus double, the outer whorl of short subulate bristles. E.
E. divergens T. & G. (Spreading Flea-bane)
- hh. Perennial; heads 1 to few on each stem; pappus of a single whorl of bristles. W. *E. glaucus* Ker.
- SS. Blades of the basal leaves linear or lanceolate; leaves all entire.
- i. Stems unbranched, usually with only 1 head.
- j. Rays blue or purple, 30—40. W. *E. pacificus* How.
- jj. Rays white or ochroleucous.
- k. Leaves linear-lanceolate; rays 20—50, white. E.
E. nevadensis Gray
- kk. Leaves narrowly linear.
- l. Plant 1—2.5 dm. high, hirsute; rays 50—80, white. (See e.)
- ll. Plant 2.5—4.5 dm. high, ashy-pubescent to glabrate; rays 40—60, white or ochroleucous. (See F.)
- ii. Stems branched, usually with several to many heads.
- m. Rays 20—30.
- n. Leaves 3-veined, linear-lanceolate. (See Z.)
- nn. Leaves 1-veined, linear or filiform. W. E. (*E. decumbens*).
E. linearis Pip.
- mm. Rays 50—80.
- o. Rays 6—8 mm. long, white. (See e.)
- oo. Rays about 12 mm. long, white or purple or violet. E. (*E. hispidissimus*). *E. concinnus* T. & G.
- HH. Leaves dissected or deeply cleft.
- p. Leaves 2—3 times ternately-parted or -divided. E.
E. compositus Pursh
- pp. Leaves once ternately- or quinately-cleft or -parted. W. C. E. (*E. trifidus*).
E. compositus trifidus Gray
- AA. Rays very short or none.
- q. Lower stem-leaves ternately-cleft or -parted. C.
E. compositus discoideus Gray
- qq. Leaves entire or merely dentate.
- r. Stems unbranched, mostly with only 1 head, tufted, 5—15 cm. high.
- s. Herbage more or less ashy-puberulent. E. *E. bloomeri* Gray
- ss. Herbage glabrous. U. *E. nudatus* Gray
- rr. Stems branched, mostly with few to many heads, not tufted.
- t. Heads cymose; rays none; involucre glabrous; perennial. C. E. (*E. inornatus*).
E. radiatus Pip. (Pine Flea-bane)
- tt. Heads paniculate; rays short; involucre glabrous; annual. W. E. (*Leptilon canadense*).
E. canadensis L. (Horse-weed)
- ttt. Heads cymose; rays short; involucre hairy at base; biennial.
- u. Hirsute pubescent; basal leaves spatulate. C. E.
E. acris L. (Bitter Flea-bane)
- uu. Sparsely pilose; basal leaves obovate to oblong. W. C. E.
E. acris debilis Gray
- uuu. Glabrate or glabrous; basal leaves spatulate. C.
E. acris droebachensis Blytt.

SERICOCARPUS

WHITE-TOPPED ASTER

Herbs, perennial; ours 3—6 dm. high, leafy to the top, glabrous to slightly rigid-pubescent. Leaves alternate; in ours oblong-lanceolate, entire, 2.5—5 cm. long. Heads radiate, 12—15-flowered, 10—15 mm. long (ours), in cymose panicles; involucre ob-

long or narrowly campanulate; bracts linear-oblong, appressed, white with somewhat spreading green tips, imbricated, the outer shorter; receptacle honey-combed. Ray-flowers about 5, distant, white, sometimes inconspicuous. Disk-flowers pale yellow. Akenes narrow, silky-pubescent or villous. Pappus of 1 whorl of capillary bristles. (Gk. *serikos*=silky, *karpos*=fruit; referring to the hairy akenes.) W. (*S. oregonensis*.)
S. rigidus Lindl.

BACCHARIS

WINE-BUSH

Ours a shrub, glabrous, glutinous, 1—12 dm. high, much branched. Leaves alternate; in ours sessile, obovate to wedge-shaped, obtuse, entire to coarsely toothed, about 25 mm. long. Heads rayless, staminate and pistillate ones on different plants, many-flowered, white or yellowish, inconspicuous, 4—6 mm. long (ours); involucre-bracts scarious to tip, the outer shorter. Staminate corolla tubular, 5-lobed, with an imperfect ovary. Pistillate corolla filiform, small. Pappus-bristles capillary. (The name of some shrub dedicated to the god Bacchus.)

B. pilularis DC.

INULEAE (ELECAMPANE TRIBE)—Herbs. Leaves in ours entire (except *Inula*). Heads not radiate (except *Inula*). Involucre usually dry and scarious. Pistillate flowers mostly filiform and truncate. Anthers tailed at base (except *Dimeresia* and *Adenocaulon*). Style-branches naked, obtuse to truncate, unappendaged. Pappus none or of capillary bristles.

A. Heads less than 2 cm. wide, rayless; basal leaves smaller than in AA; leaves often white-woolly.

B. Leaves linear to oblong or obovate, not cordate at base, often woolly on both sides.

C. Leaves alternate.

D. Pappus none, except a few bristles on sterile flowers.

E. Style and corolla lateral; plant simple or sparingly branched above, loose-woolly. **MICROPUS** (p. 392)

EE. Style and corolla terminal; plant branching from the base, appressed woolly. **STYLOCLINE** (p. 392)

DD. Pappus of capillary bristles.

F. Involucre-bracts many and white thruout, conspicuous and almost hiding the small group of yellow flowers within. **ANAPHALIS** (p. 393)

FF. Involucre-bracts either few or not white thruout, not so conspicuous as the group of flowers within.

G. Heads dioicous or sometimes the 2 kinds on the same plant; pappus-bristles of the staminate flowers swollen at tip. **ANTENNARIA** (p. 393)

GG. Heads all alike, of both pistillate and perfect flowers; pappus-bristles not swollen at tip. **GNAPHALIUM** (p. 394)

CC. Most of the leaves opposite.

H. Pappus none or of capillary bristles; heads many-flowered; involucre-bracts several to many.

I. Receptacle depressed-globose, chaffy; akenes inclosed in involucre-bracts. **PSILOCARPHUS** (p. 392)

II. Receptacle columnar, villous; akenes hardly inclosed in involucre-bracts. **EVAX** (p. 392)

HH. Pappus of stout plumose bristles; heads 2-flowered; involucre-bracts 2. **DIMERESIA** (p. 395)

- BB. Leaves broadly ovate, cordate at base, glabrous and green above, white-woolly beneath; pappus none. ADENOCaulon (p. 395)
 AA. Heads 3—10 cm. wide, radiate; basal leaves 1—2 dm. wide, 2—5 dm. long; leaves pubescent but not woolly; pappus-bristles capillary, rough. INULA (p. 395)

MICROPUS

Annual, low, floccose-woolly. Leaves alternate; in ours linear to lanceolate, 12—16 mm. long. Heads several-flowered, inconspicuous, in sessile clusters; involucre-bracts few. Outer flowers pistillate, each rolled up in a bract; bract laterally flat, falling with the seed. Inner flowers with stamens and pistils but sterile, few, bractless; corolla tubular; 4—5-toothed. Akenes obovate, gibbous, laterally flattish, smooth; apex lateral. Pappus none. (Gk. mikros=small, pous=a foot. Why?) U.

M. californicus F. & M.

STYLOCLINE

Annual, low floccose-woolly. Leaves alternate; in ours linear to spatulate, 12—18 mm. long. Heads in head-like clusters, many-flowered; receptacle columnar; involucre-bracts inconspicuous or almost none. Outer flowers pistillate, each rolled up in a bract; bract broadly boat-shaped. Inner flowers with stamens and pistil but sterile, few, bracted; corolla tubular, 4—5-toothed. Akene obovate or oblong, narrow at base, apex terminal. Pappus none except for a few bristles on the sterile flowers. (Gk. stylos=a column, kline=a bed; referring to the receptacle.) U.

S. filaginea Gray

PSILOCARPHUS

Annual, low, floccose-woolly. Leaves mostly opposite. Heads small, in terminal head-like clusters and in the stem-forks, the terminal cluster subtended by a whorl of leaves; flowers many, small; receptacle depressed-globose; involucre-bracts few, small. Outer flowers pistillate, many, each enclosed by a bract; bract inflated, soft-woolly. Inner flowers with stamens and pistil but sterile, bractless; corolla tubular, 4—5-toothed. Akenes oblong or cylindric, flattish, straight, small, loose in the bract. Pappus none. (Gk. psilos=naked, carphos=a small dry body; probably referring to the absence of pappus on the akenes.)

A. Leaf-blades widest above their middle; wool of the heads short, close.

B. Prostrate; leaves oblong to spatulate. W.

P. tenellus Nutt.

BB. Ascending; leaves narrowly oblanceolate. E.

P. oreganus Nutt.

AA. Leaf-blades often widest below their middle; wool of the heads long, loose.

C. Mostly simple; leaves 4—10 mm. long; heads densely woolly. E.

P. brevissimus Nutt.

CC. Mostly branched; leaves 12—25 mm. long; heads sparsely woolly. W. E.

P. elatior Gray

EVAX (Hesperevax, Filago)

Annual, low, floccose-woolly. Leaves mostly opposite, in ours lanceolate, 8—12 mm. long. Heads small, in somewhat head-like clusters; flowers inconspicuous, many; receptacle columnar, villous; involucre-bracts chaffy. Outer flowers pistillate, several to many, bracted; bract ovate, chaffy. Inner flowers with stamens and pistil but sterile,

several, the group involucre by 3—7 tough bracts. Akenes pear-shaped, flattish. Pappus none in ours. (Origin? Possibly from Gk. *evaxos*=easily broken.) U.

E. brevifolia Gr.

ANAPHALIS

PEARLY EVERLASTING

Perennial, white-woolly; stem erect, leafy. Leaves alternate, lanceolate, sessile. Heads dioicous, many, corymbose; involucre-bracts many, white; receptacle chaffy, convex; flowers yellow. Pistillate corolla 5-toothed; pappus-hairs distinct to base. Staminate corolla slender; style unlobed; pappus-hairs united at base. Akenes oblong. Pappus of many capillary bristles. (Gk. *a*=not, *knaphalon*=a lock of wool; because the heads are chaff rather than wool. See *Gnaphalium*.) W. C. E. (*A. margaritacea occidentalis*; *A. margaritacea subalpina*; *A. subalpina*.)

A. margaritacea Benth.

ANTENNARIA

EVERLASTING

Perennial, woolly. Leaves alternate. Heads dioicous or polygamo-dioicous; flowers many, inconspicuous; involucre-bracts many, imbricate, white or colorless at least at tip; receptacle flat or convex, naked. Pappus-bristles very slender, united at base. Staminate-corolla tubular, 5-lobed; style unlobed; pappus bristles crisp, usually thicker at apex. Akenes small. Pappus of capillary bristles, in 1 whorl. (The pappus-bristles of the sterile flowers suggested the antennae of insects.)

A. Heads solitary; pappus-bristles of the staminate flowers not dilated at tip.

B. Plant with slender naked stolons. E. *A. flagellata* Gray

BB. Plant without slender stolons but sometimes with thick ones.

C. Pistillate stems 6—10 cm. high. E. *A. latisquama* Pip.

CC. Pistillate stems 2—3 cm. high. E. *A. dimorpha* T. & G.

AA. Heads few to many.

D. Plants stoloniferous, growing in patches.

E. Leaves over 3—6 cm. long including the petiole.

F. Heads loosely racemose; inflorescence glandular. W. C. E.

A. racemosa Hook.

FF. Heads corymbose; inflorescence not glandular.

G. Leaves green and glabrate above. W. C. E.

A. howellii Gr.

GG. Leaves tomentose on both sides.

H. Stems 8—24 cm. high; involucre 5—7 mm. high. E.

A. leucophaea Pip.

HH. Stem 20—30 cm. high; involucre 8—9 mm. high. W. C. E.

A. concolor Pip.

EE. Leaves 1—2.5 cm. long including the petiole.

I. Tips of involucre-bracts brown or green.

J. Leaves glabrate above, loosely tomentose beneath. C.

A. tomentella Nels.

JJ. Leaves white-hairy on both sides.

K. Plant not shrubby at base, 2—7 cm. high. W. C. E.

A. media Gr.

KK. Plant shrubby at base, 10—15 cm. high. E.

A. umbrinella Rydb.

II. Tips of involucre-bracts white or pink or yellowish.

L. Plant shrubby at base.

- M. Involucre 8—10 mm. high, its bracts white-tipped. U.
A. suffrutescens Gr.
- MM. Involucre 5—7 mm. high, its bracts yellow-tipped. E.
A. confinis Gr.
- LL. Plant herbaceous thruout.
- N. Tips of the involucre-bracts white.
- O. Inflorescence glandular. E. *A. pedicellata* Gr.
- OO. Inflorescence not glandular.
- P. Basal leaves oblanceolate. C. *A. hendersoni* Pip.
- PP. Basal leaves spatulate. E. *A. parvifolia* Nutt.
- NN. Tips of involucre-bracts pink.
- Q. Leaves obtuse, spatulate. W. E. *A. concinna* Nels.
- QQ. Leaves acute, sharply oblanceolate. W. C. E. (*A. rosea imbricata*; *A. rosea angustifolia*.)
- DD. Plants not stoloniferous. *A. rosea* Gr.
- R. Pappus-bristles of the staminate flowers not dilated at tip. E.
A. stenophylla Gray
- RR. Pappus-bristles of the staminate flowers dilated at tip.
- S. Involucre glabrous or nearly so to base. W. E. (*A. argentea*.)
A. luzuloides T. & G.
- SS. Involucre very woolly at least at base.
- T. Plant silky-canescens; pistillate heads oblong, the bracts pinkish. C. E.
A. geyeri Gray
- TT. Plants floccose-woolly; pistillate heads not oblong, the bracts white or brownish.
- U. Plant alpine, 5—10 cm. high. W. C.
A. lanata Gr.
- UU. Plant not alpine, 25—60 cm. high.
- V. Tips of involucre-bracts conspicuously white-papery. E.
A. anaphaloides Rydb.
- VV. Tips of involucre-bracts not conspicuously papery. E.
A. pulcherrima Gr.

GNAPHALIUM

CUDWEED

Woolly, erect or diffusely branched. Leaves alternate. Heads all alike, in spikes or racemes or head-like clusters, of pistillate and perfect flowers; involucre-bracts imbricate, in several series, often partly woolly; receptacle not chaffy. Pistillate corollas minutely dentate or 3—4-lobed. Perfect flowers central, few; corolla 5-lobed. Akenes oblong or obovate. Pappus-bristles capillary, in 1 whorl, sometimes united at base. (Gk. knaphalon=a lock of wool; referring to the heads. See *Anaphalis*.)

- A. Leaves green and glandular on the upper side. C. E. (*G. decurrens californicum*.)
G. decurrens Ives (Sticky Cudweed)
- AA. Leaves densely white-hairy on both sides.
- B. Flowers rather loose leafless clusters; involucre-bracts woolly only at base.
- C. Plants 3—9 dm. high; involucre white or yellow; heads in 1 or more head-like clusters; pappus-hairs not united at base.
- D. Involucre white; head-clusters loose. W. C. E. *G. microcephalum* Nutt.
- DD. Involucre yellowish; head-clusters dense. W. E. (*G. sprengelii*.)
G. chilense Spreng.
- CC. Plants 1—3 dm. high; involucre brownish; heads in 1 spike-like cluster; pappus-hairs united at base. W. E.
G. purpureum L. (Purplish Cudweed)

BB. Flowers in dense leafy clusters; involucre-bracts woolly except at tip.

E. Involucre-bracts yellowish or white; plant loose-woolly. W. E.

G. palustre Nutt. (Marsh Cudweed)

EE. Involucre-bracts brownish; plant appressed-woolly. W. E.

G. uliginosum L. (Wart-wort)

DIMERESIA

Annual, low, finely woolly. Leaves opposite; in ours oval to obovate, petioled, glabrate and green above. Heads many, all alike; flowers perfect; involucre-bracts 2, herbaceous, each almost enclosing a flower. Corolla regular, tubular, 5-toothed, purple or flesh-color. Anthers sagittate but not tailed at base. Akenes clavate-pyriform, glabrous, many-striate. Pappus-bristles stout, plumose, in 1 whorl, united at base, early deciduous. E.

D. howellii Gray

ADENOCaulon

Perennial; stem conspicuously glandular above. Leaves alternate, wide, white-woolly beneath, green and glabrous above; petioled, in ours deltoid-ovate with cordate base. Heads small, paniced; involucre-bracts few, herbaceous, receptacle nearly flat, naked. Corolla tubular, white. Pistillate flowers marginal, fertile. Perfect but sterile flower central; anthers slightly sagittate at base; style not 2-lobed. Akenes obovoid or clavate, obtuse, faintly veined, glandular above, much exceeding the involucre-bracts. (Gk. aden=a gland, kaulos=a stem.) W. C. E.

A. bicolor Hook. (Silver-green)

INULA

Perennial, pubescent (ours). Leaves alternate; in ours denticulate, the basal 1—2 dm. wide by 2—5 dm. long, the stem-leaves sessile or clasping. Heads large, radiate, all alike; flowers many; involucre-bracts imbricate, in several series, the outer often foliaceous; receptacle not chaffy, flat or convex. Ray-flowers pistillate; corolla 3-toothed, yellow. Disk-flowers perfect; corolla tubular, yellow, 5-toothed. Akene 4—5-ribbed. Pappus-bristles capillary, rough. (The Latin name.) W.

I. helenium L. (Elecampane)

HELIANTHEAE (SUNFLOWER TRIBE)—Herbs, annual or perennial. Leaves commonly opposite at least below. Heads all alike, or staminate and pistillate flowers in separate heads, radiate or rayless; involucre not scarious tho sometimes bur-like or prickly; receptacle chaffy. Ray-flowers neutral or pistillate, when pistillate either sterile or fertile: corolla ligulate, in ours yellow or white or pinkish. Disk-flowers staminate or pistillate or perfect, fertile or sterile: corolla 4—5-lobed, in ours brown or purple or white or pink or yellow. Anthers not tailed at base. Style branches of the perfect flowers truncate or tipped with a hairy appendage. Pappus none or never of capillary bristles. A. Heads radiate, i. e., with some ligulate outer flowers.

B. Rays yellow.

C. Disk-flowers dark brown or purple.

D. Upper leaves mostly not dissected, or when some are dissected the plant not glabrous; pappus of 2 to several teeth or awns.

E. Receptacle in fruit conical to columnar, akenes 4-angled, not winged; leaves alternate, entire to pinnatifid.

RUDBECKIA (p. 399)

- EE. Receptacle in fruit flat or convex; akene flat or 4-angled, often somewhat winged; leaves alternate or opposite, entire or merely dentate.
- F. Annual; receptacle flat; akene somewhat 4-angled, not at all winged.
HELIANTHUS (p. 400)
- FF. Perennial; receptacle convex; akene flat, 1 or both edges somewhat winged.
HELIANTHELLA (p. 401)
- DD. Upper leaves nearly all of 3 leaflets; plant glabrous thruout; pappus of 2 short teeth.
COREOPSIS (p. 401)
- CC. Disk flowers yellow.
- G. Pappus either none or else not of retrorsely-barbed awns.
- H. Heads 2.5 cm. or more wide; involucre-bracts flat or nearly so, not enclosing a ray akene; leaves often wider than lanceolate.
- I. Most of the leaves basal; ray-flowers pistillate, fertile.
- J. Pappus none; leaves opposite or alternate, in some species pinnately lobed to pinnatifid.
BALSAMORHIZA (p. 399)
- JJ. Pappus a crown or of 3—10 teeth, some of which may be awn-tipped; leaves all alternate, mostly entire, never pinnately lobed.
WYETHIA (p. 400)
- II. Most of the leaves on the stem; ray-flowers neutral; pappus of 2—6 deciduous scales or awns.
HELIANTHUS (p. 400)
- HH. Heads less than 2.5 cm. wide; involucre-bracts boat-shaped, more or less enclosing an outer or ray akene; leaves lanceolate or narrower (except *Lagophylla*.)
- K. Akenes flattened laterally, i. e., at right angles to the involucre; involucre-bracts keeled on the back; plants mostly viscid-glandular; pappus none except in *M. madioides*, of 5—8 scales.
MADIA (p. 402)
- KK. Akenes not flattened laterally; involucre-bracts rounded or flattish on the back.
- L. Pappus none.
- M. Leaves of the stem pinatifid; leaves of the branches and fascicles entire, spinulose-tipped; involucre-bracts spinulose-tipped; disk-flowers 10 or more; ray-flowers 10 or more; most of the leaves alternate.
HEMIZONIA (p. 403)
- MM. Leaves all entire, not spinulose-tipped; involucre-bracts not spinulose-tipped; disk-flowers 1—6; ray-flowers 4—6.
- N. Disk flowers 1—2, fertile; akenes slightly hairy; plant 2.5—20 cm. high; most of the leaves opposite, 2.5 or less long.
HEMIZONELLA (p. 403)
- NN. Disk-flowers 5—6, sterile; akenes smooth; plant 15—75 cm. high; most of the leaves alternate, 5 cm. or less long.
LAGOPHYLLA (p. 403)
- LL. Pappus present at least on the disk akenes, of 7—12 scales which are often awn-tipped.
- O. Upper leaves spinulose- or gland-tipped; pappus of 7—12 scales, in 1 whorl, often awn-tipped, its scale portion 3 mm. or less
HEMIZONIA (p. 403)
- OO. Leaves neither spinulose- nor gland-tipped; pappus of about 10 scales, in 2 whorls, not awn-tipped, inner whorl about 6 mm. long.
ACHYRACHAENA (p. 404)
- GG. Pappus of 2—6 stout retrorsely-barbed awns; heads 0.8—10 cm. wide.
BIDENS (p. 401)
- BB. Rays white or pink.

- P. Involucre-bracts almost flat, not enclosing the ray akenes; leaves narrowly linear, margins involute or revolute; heads 12—30 mm. wide; rays 3—6.
BLEPHARIPAPPUS (p. 402)
- PP. Involucre-bracts boat-shaped, enclosing each an outer or ray akene.
- Q. Heads 12—25 mm. wide; rays 8—13; basal leaves often laciniately-lobed or -incised.
LAYIA (p. 404)
- QQ. Heads 4—12 mm. wide; rays 1—7; leaves all entire or nearly dentate.
HEMIZONIA (p. 403)
- AA. Heads rayless, i. e., without ligulate flowers.
- R. Pappus none; heads few-flowered; flowers yellow or greenish, the staminate and pistillate often in separate heads; fruit often bur-like.
- S. Leaves broadly lanceolate or wider, often lobed or pinnatifid; heads staminate or pistillate or with both kinds of flowers.
- T. Involucre neither tubercled nor spiny; fruit not a bur; staminate and pistillate flowers in the same head; plant merely puberulent or scabrous; lower leaves opposite.
IVA (p. 397)
- TT. Involucre of pistillate heads either tubercled or spiny, making fruit rough or bur-like; staminate and pistillate flowers in separate heads; plant either hairy or all the leaves alternate.
- U. Involucre-bracts of the staminate heads united; fruit often not a bur but when so the bristles usually not hooked.
- V. Fruit with 1 whorl of prickles at the top, 1-seeded.
AMBROSIA (p. 398)
- VV. Fruit with prickles in more than 1 whorl or scattered, 1—4-seeded.
FRANSERIA (p. 398)
- UU. Involucre-bracts of the staminate heads distinct; fruit a bur with 20—100 usually hooked bristles.
XANTHIUM (p. 398)
- SS. Leaves linear or linear-lanceolate, entire or remotely serrulate; heads with perfect flowers only; involucre neither tubercled nor spiny.
MADIA (p. 402)
- RR. Pappus of short teeth or barbed awns; heads many-flowered, all alike; flowers yellow or brown or purple, perfect; fruit not bur-like.
- W. Leaves all alternate; flowers purple or brown; pappus a crown of 2—4 scales.
RUDBECKIA (p. 399)
- WW. Leaves opposite at least below; flowers yellow; pappus of 2—6 retrorsely-barbed awns.
BIDENS (p. 401)

IVA

MARSH ELDER

Puberulent or scabrous. Leaves opposite or the upper alternate, simple, somewhat 3-veined from base. Heads rayless but with 2 forms of flowers, small, nodding, greenish, either solitary in the leaf-axils or else in spikes or racemes or panicles; involucre-bracts few, rounded. Marginal-flowers 1—6, pistillate, fertile: corolla none or tubular. Disk-flowers perfect, sterile, 5-lobed. Akenes flattish, obovoid, glabrous. Pappus none. (Named from *Ajuga iva*, a plant with a similar odor.)

A. Leaves oblong to obovate, mostly entire, sessile; heads mostly solitary in the axils; involucre bracts about 5; perennial. E.

I. axillaris Pursh (Poverty-weed)

AA. Leaves ovate to orbicular, coarsely serrate, long-petioled; heads in axillary spikes; involucre bracts about 10; annual. E.

I. xanthifolia Nutt.

AMBROSIA

RAGWEED

Branched. Leaves alternate or opposite, entire to pinnately- or palmately-divided. Heads small, green, monoicous (ours). Staminate heads in spikes or racemes, in the upper axils and terminal; involucre mostly hemispheric or saucer-shaped, 5—12-lobed, open, many-flowered; receptacle nearly flat: corolla funnelform, 5-toothed. Pistillate heads solitary or clustered, in the upper axils; involucre globose-ovoid or top-shaped, closed, 1-flowered, usually with 4—8 tubercles or spines: corolla none: stamens none. Akenes ovoid or obovoid. Pappus none. (Gk. ambrosia=food for the gods; quite inappropriate for ours.)

- A. Leaves all opposite, entire to coarsely and palmately 3—5-lobed or -cleft; receptacle naked; involucre of the staminate heads 3—4-ribbed; annual. E.

A. trifida L. (Great Ragweed)

- AA. Some of the leaves often alternate, entire to 1—3-pinnatifid; receptacle chaffy; involucre of the staminate heads not ribbed.

- B. Leaves of the upper 1/3 of the plant mostly entire, ovate to lanceolate, acute, 3-veined. E.

A. artemisiaefolia diversifolia Pip.

- BB. Leaves pinnately lobed or pinnatifid to the inflorescence.

- C. Annual; leaves thin, 2-pinnatifid; fruit with acute teeth. E.

A. artemisiaefolia L. (Bitter-weed)

- CC. Perennial; leaves thick, 1-pinnatifid; fruit with blunt teeth or unarmed. E.

A. psilostachya DC. (Western Ragweed)

FRANSERIA (Gaertneria)

SAND-BUR

Sometimes woody at base, hispid or tomentose, branched. Leaves mostly alternate, serrate to much pinnatifid. Heads small, greenish, monoicous. Staminate heads in terminal spikes or racemes, sessile or short-peduncled; involucre broadly hemispheric, open, 5—12-lobed: corolla 5-lobed. Pistillate heads solitary or clustered, in the upper axils; involucre ovoid or globose, closed, 1—4-celled, 1—4-beaked, 1—4-flowered, with several rows of spines and thus forming a bur in fruit: corolla none or rudimentary: stamens none. Akenes obovoid, thick. Pappus none. (Honor of A. Franseri, a Spanish botanist.)

- A. Seashore plants; perennial, prostrate; spines of the burs thick but flat.

- B. Leaves cuneate-obovate, serrate or laciniate. W. *F. chamissonis* Less.

- BB. Leaves twice or thrice pinnately parted. W. *F. bipinnatifida* Nutt.

- AA. Not seashore plants; annual, erect or spreading; spines of the burs thin and flat. E.

F. acanthicarpa Cov.

XANTHIUM

COCKLEBUR

Annual, branched, coarse or rough or spiny. Leaves alternate, lobed or dentate, pinnately veined. Heads rayless, small, greenish, monoicous. Staminate heads in head-like clusters at the ends of the branches; involucre-bracts in 1—3 series; receptacle cylindric: corolla tubular, 5-toothed: filaments monadelphous. Pistillate heads in the leaf-axils, bur-like, ovoid or oblong; involucre the spiny covering enclosing the 2 flowers and later the akenes, 1—2-beaked, 2-celled; spines hooked: corolla slender, thread-like, apparently none. Akenes 2, oblong, flat. Pappus none. (Gk. xanthos=yellow; the Greeks secured a yellow hair-dye from one of them.)

- A. Leaves attenuate at both ends, with a 3-forked spine where petiole joins stems. E.

X. spinosum L. (Spiny Cocklebur)

- AA. Leaves cordate or ovate; without spine at base.
- B. Body of mature bur 2.5—3 cm. long; spines about 100, stiff, strongly hooked, about half as long as the body of the bur. E.
X. speciosum Kearn.
- BB. Body of mature bur 1.5—2 cm. long.
- C. Spines 50—70.
- D. Spines about 70, about $\frac{1}{2}$ as long as the diameter of the body of the ovate mature bur. E. (Apparently *X. canadense* for our region.)
X. varians Gr.
- DD. Spines about 50, about $\frac{2}{3}$ as long as the diameter of the body of the oblong or slightly ovate mature bur. E. (Apparently *X. strumarum* for our region.)
X. affine Gr.
- CC. Spines about 20, about as long as the body of the narrowly oblong bur. E.
X. oligacanthum Pip.

RUDBECKIA

CONE-FLOWER

Coarse, often rough. Leaves alternate, entire to pinnatifid. Heads rayless or radiate, large, on long peduncles, solitary, in the axils or terminal; involucre-bracts imbricated in 2—4 series; receptacle conic or convex. Ray-flowers yellow or none, neutral, entire or toothed. Disk-flowers purple or brown, perfect, fertile, 4-lobed. Akenes 4-angled, obtuse or truncate. Pappus none or a crown of 2—4 short teeth. (Honor of C. Rudbeck, a Swedish botanist.)

- A. Rays present.
- B. Leaves stiff-hairy; pappus none; disk globose-ovoid. W.
R. hirta L. (Black-eyed Susan)
- BB. Leaves finely soft-hairy; pappus of 4 irregular bract-like teeth; disk columnar.
- U. *R. californica* Gray (Mexican Hat)
- AA. Rays none.
- C. Plant pubescent; leaves mostly 3—5-parted toward the base. E.
R. alpicola Pip.
- CC. Plant glabrous or nearly so, somewhat glaucous; leaves entire or dentate. E.
R. occidentalis Nutt. (Nigger-thumb)

BALSAMORHIZA

BALSAM-ROOT

Perennial, low, with scape-like or few-leaved stems; roots thick, resinous. Leaves opposite or alternate, mostly basal, entire to 2-pinnate. Heads radiate, many-flowered, large, 1—7 on a stem; involucre-bracts somewhat imbricated, the outer herbaceous or foliaceous; receptacle flat or barely convex. Ray-flowers pistillate, fertile, yellow; akenes flattened parallel to the bracts, oblong. Disk-flowers perfect, yellow; akenes prismatic, 4-angled, somewhat flattish. Pappus none. (Gk. balsamon=balsam, rhiza=root; the root is aromatic.)

- A. Leaves entire to serrate; stems with 1—7 heads.
- B. Ray-corolla 2—2.5 cm. long, persistent to the akenes; akenes all canescent. E.
B. careyana Gray
- BB. Ray-corollas 2.5—5 cm. long, deciduous from the akenes; akenes all glabrous.
- C. Plant silvery-canescant; involucre woolly; stem-leaves linear to spatulate. E.
B. sagittata Nutt.
- CC. Plant green tho pubescent to glabrate; involucre not woolly or only so at base; stem-leaves lanceolate. W. E. *B. deltoidea* Nutt.
- AA. Leaves laciniately lobed to 2-pinnatifid; stems with only 1 head.
- D. Plant green, glabrous or somewhat hairy.

- E. Leaves deltoid in outline, entire to lacinate, not stiff-hairy; involucre more or less woolly, not stiff-hairy. E. *B. terebinthacea* Nutt.
 EE. Leaves lanceolate in outline, pinnately-parted or -divided, stiff-hairy; involucre rarely woolly, stiff-hairy. E. *B. hirsuta* Nutt.
 DD. Plant canescent or white-tomentose.
 F. Plant canescent, with appressed or spreading hairs; leaf-divisions linear. W. *E. (B. balsamorhiza.)* *B. hookeri* Nutt.
 FF. Plant densely white-tomentose with often floccose hairs; leaf-division oval or oblong. E. *B. incana* Nutt.

WYETHIA

Perennial; stems usually simple, from stout root or rhizome. Leaves alternate, mostly basal, mostly entire and large. Heads radiate, large, 1 to few on a stem, many-flowered, all alike; involucre-bracts loosely imbricated in 1—3 series, the outer large and often foliaceous; receptacle slightly convex. Ray-flowers pistillate, fertile, yellow, 2—10 cm. long (ours). Disk-flowers yellow, 5-toothed. Akenes 4—5-angled. Pappus crown-like, lacinate or 3—10-toothed, 0—4 of the teeth prolonged into an awn. (Honor of N. J. Wyeth, an American botanist.)

- A. Ray-corollas white to pale-yellow; leaves oval to broadly-lanceolate; stem stiff-hairy. E. *W. helianthoides* Nutt.
 AA. Ray-corollas bright-yellow; leaves oblong-lanceolate to narrowly lanceolate.
 B. Plant sparsely stiff-hairy; involucre very stiff-hairy. W. E. (*W. robusta.*) *W. angustifolia* Nutt.
 BB. Plant smooth and glabrous thruout; involucre glabrous.
 C. Basal leaves oblong-lanceolate, 17—38 cm. long, 7—10 cm. wide; upper stem-leaves partly clasping. E. *W. amplexicaulis* Nutt. (Pe-ik)
 CC. Basal leaves lanceolate, 5—15 cm. long, 2—10 cm. wide; upper stem-leaves barely sessile and not clasping. E. *W. lanceolata* How.

HELIANTHUS

SUNFLOWER

Leaves opposite or alternate, simple. Heads radiate, large; solitary or in corymbs; involucre-bracts imbricated in several series; receptacle flat to conic. Ray-flowers yellow, neutral, usually entire. Disk-flowers yellow or brown or purple, perfect, fertile, 5-lobed. Akene oblong or obovate, flattish to 4-angled. Pappus of 2 scales or awns, or sometimes with 2—4 additional shorter ones, deciduous. (Gk. helios—the sun, anthos—a flower; said to refer to the resemblance.)

- A. Annual; disk-flowers brownish or dark purple.
 B. Leaves ovate-lanceolate or wider; rays more than 8; chaff of the receptacle 3-toothed or -cleft, not awn-like at tip; disk often over 12 mm. wide.
 C. Disk about 1.5 cm. wide; leaves oblong to ovate-lanceolate, 2.5—8 cm. long. E. *H. petiolaris* Nutt. (Prairie Sunflower)
 CC. Disk 2.5 cm. or more wide; at least the lower leaves ovate or cordate, 5—17 cm. long. E. *H. annuus* L. (Common Sunflower)
 BB. Leaves lanceolate to linear-lanceolate; rays 5—8; chaff of the receptacle not 3-toothed, narrowed into an awn-like tooth; disk 12 mm. or less wide. U.
 AA. Perennial; disk-flowers yellow.
 D. Stems 1.2 m. or less high or long, often not erect; plant scabrous, without hairs; leaves entire or serrulate.
 E. Stems 3—12 dm. high or long; leaves acute or acuminate, entire or serrulate. E. *H. nuttallii* T. & G.

EE. Stems 1—3 dm. high or long; leaves obtuse, entire. E.

H. cusickii Gray

DD. Stems 1.5—3.5 m. high, erect; plant pubescent or hirsute; leaves coarsely serrate or lobed. W. E. *H. tuberosus* L. (Jerusalem Artichoke)

HELIANTHELLA

Perennial; stems simple or nearly so. Leaves opposite or alternate, scattered, entire, sessile or the lower petioled. Heads radiate, large, yellow, usually solitary, many flowered; involucre-bracts linear-lanceolate, imbricated in about 2 series, somewhat foliaceous; receptacle flat or convex. Ray-flowers neutral, yellow, 2.5—3 cm. long (ours). Disk-flowers perfect, purplish (ours), 5-toothed. Akenes flat, obovate, one or both margins slightly winged. Pappus of 1 awn or chaffy tooth at each margin at the apex, often with scales or short bristles like hairs between them. (Diminutive of *Helianthus*, a related genus.)

A. Stem stiff-hairy with spreading hairs at least above. E.

H. douglasii Torr.

AA. Stem minutely pubescent or scabrous to glabrous. E.

H. uniflora T. & G.

COREOPSIS

TICK-SEED

Biennial (ours), mostly erect, mostly branched above, glabrous thruout (ours). Leaves opposite or the upper alternate; in ours the lower 2-pinnately-parted or -divided, the upper mostly 3-foliolate. Heads radiate, long peduncled, cymose (ours); involucre-bracts in 2 series, united at base, outer usually shorter; receptacle flat to concave. Ray-flowers neutral, in ours yellow but brown at base. Disk-flowers perfect, fertile, dark purplish-brown (ours), 5-toothed. Akenes flat, orbicular to oblong, winged (ours). Pappus in ours of 2 short teeth. (Gk. *koris*=a bug, *opsis*=like; referring to the form of the akenes.) W. E. *C. atkinsoniana* Dougl.

BIDENS

BEGGAR-TICK

Leaves opposite at least below. Heads radiate or rayless, solitary in panicles, mostly rather large; involucre-bracts in 2 series, the outer often foliaceous and much larger; receptacle flat or nearly so. Ray-flowers when present neutral, yellow (ours). Disk-flowers perfect, yellow, perfect, 5-toothed. Akenes 4-angled to nearly terete, cuneate-oblong to linear. Pappus of 2—6 teeth or awns (ours); awns retrorsely hispid or barbed. (L. *bi*=2, *dens*=a tooth; the akenes of some have 2 barbed teeth.)

A. Leaves usually 5-divided; plant terrestrial; pappus of 2 awns; akene and awns retrorsely barbed to base; annual. E. (Apparently *B. frondosa* for our region.)

B. vulgata Gr. (5-leaved Beggar-tick)

AA. Leaves serrate to lacinate, or submerged and divided into many capillary segments; pappus of 3—6 awns.

B. Annual, terrestrial; stem erect; leaves 7—15 cm. long; rays none or not over 16 mm. long; akenes not barbed; pappus-awns retrorsely barbed above only. W. E.

B. vernua L. (Nodding Beggar-tick)

BB. Perennial, aquatic; stem slender and not usually erect; leaves 1—5 cm. long; rays 20—25 mm. long; akenes retrorsely barbed at margins; pappus awns retrorsely barbed to base. W. E. *B. boeckii* Torr. (Water Beggar-tick)

BLEPHARIPAPPUS (*Ptilonella*)

Annual, branched, 1—3 dm. high. Leaves alternate, narrow, linear, sessile, entire. Heads radiate, 6—12 mm. long (ours); involucre-bracts nearly in 1 series, almost equal; receptacle convex. Ray-flowers 3—6, pistillate, fertile, white, broad-cuneiform, 3-toothed. Disk-flowers 6—12, perfect or the central ones sterile, white or purplish, 5-toothed. Akenes turbinate, silky-villous. Pappus none or scale-like; scales 10—12, linear or awn-like; their margins hyaline, lacerate-fimbriate so as to appear plumose. (Gk. blepharon—an eye-lash, pappos=pappus.)

A. Plant puberulent and scabrous, with some hispid hairs above; branch-leaves not appressed; involucre bracts 8—10 mm. long; ray-corolla inrolling in sunshine. E. (*Ptilonella scabra*.) B. scaber Hook.

AA. Plant smooth; branch-leaves appressed; involucre-bracts 4—6 mm. long; ray-corolla not inrolling in sunshine. E. E. laevis Gray

MADIA

TAR-WEED

Annual, often viscid or glandular. Leaves linear or lanceolate, entire or slightly serrate, at least the upper alternate. Heads radiate or rayless, few to many flowered; involucre-bracts in 1 series, herbaceous, keeled, much inrolled at margin, enclosing the ray-akenes, their tips erect or rolled in; receptacle flat or convex. Ray-flowers 0—20, pistillate, somewhat wedge-shaped, 3-toothed, yellow. Disk-flowers perfect, fertile or sterile, 1 to many, yellow. Akenes 4-angled to flattish, glabrous. Pappus none, or in *M. madioides* of 5—8 fimbriate-lacerate scales. (From madi, the name in Chile.)

A. Disk-flowers 3 to many, their corollas pubescent; heads and ray-corollas mostly longer than in AA; peduncles not long or else not filiform.

B. Heads scattered in cymes or corymbs or panicles.

C. Most of the leaves opposite; ray-corollas 8—20 mm. long.

D. Disk-akenes with pappus of 5—8 fimbriate-lacerate scales; involucre-bracts 8—12, with short inconspicuous tips. W. (*Anisocarpus madioides*.)

M. madioides Pip.

DD. Pappus none; involucre-bracts 12—20, with long linear tips.

E. Heads in a cyme; involucre bract with linear tip almost as long as the body. W. (*Madaria elegans*.) *M. elegans* Don.

EE. Heads in a corymb; involucre-bract with linear tip not nearly as long as the body. U. E. (*Madaria corymbosa*.) *M. corymbosa* (DC.)

CC. Most of the leaves alternate; ray-corollas 4—8 mm. long or none.

F. Plant with lemon odor; ray-akenes wide. E. *M. citriodora* Gray

FF. Plant without lemon odor; ray-akenes not wide, but flattish.

G. Disk-akenes 4-angled; disk- and ray-akenes prominently 1-veined on the faces. W. E. *M. sativa* Mol. (Chili Tar-weed)

GG. Disk-akenes flattish; neither disk- nor ray-akenes prominently veined on the faces. W. E. (*M. dissitiflora*; *M. racemosa*.)

M. sativa racemosa Gray

BB. Heads congested in dense somewhat head-like clusters; pappus none; leaves mostly alternate.

H. Ray-flowers 6—12; disk-flowers 5—12; heads 12—18 mm. high. W. (*M. capitata*.) *M. sativa capitata* Pip.

HH. Ray-flowers 0—5; disk flowers 3—5; heads 6—10 mm. high.

I. Stems glandular to base; clusters of heads cymosely arranged on the plant. E. *M. ramosa* Pip.

II. Stems glandular only near top; clusters of heads racemously arranged on the plant. W. C. E. *M. glomerata* Hook.

AA. Disk-flower only 1, its corolla glabrous, heads small, 2—6 mm. high, scattered; ray-corollas 2—6 mm. long; peduncles long, filiform; pappus none. W. C. E. (*M. exigua macrocephala*; *Harpaecarpus madarioides*.) *M. exigua* Gr.

HEMIZONIA

Leaves narrow, all but the lowest alternate, entire to pinnatifid. Heads radiate, small or medium, few- to many-flowered; involucre-bracts as many as the ray-flowers, concave, half-enclosing the akenes, rarely a few extra outer ones; receptacle flat or conic. Ray-flowers 1—20, pistillate, fertile, white or pink or yellow, 2—3-toothed: akene turgid, swollen on one side, obovoid. Disk-flowers 1 to many, perfect, fertile or sterile, white or pink or yellow, 5-lobed: akenes rarely formed, narrower than those of rays. Pappus none or of 12 or fewer scales which are often awn-tipped. (Gk. hemi=half, zone=a girdle; because the ray-akenes are swollen on 1 side.)

A. Flowers white or pinkish.

B. Stem glandular above; ray-flower 5—20; pappus none; akene glabrous.

C. Stems branched above; leaves linear-lanceolate, 3—5-veined. U.

H. luzulaefolia DC.

CC. Stems branched from near the base; leaves narrowly linear, 1-veined. U.

H. clevelandi Gr.

BB. Stem not glandular; ray-flowers 3—5; pappus of 10—12 scales; akene somewhat hairy. U. (*Calycadena multiglandulosa*.)

H. multiglandulosa Gray

AA. Flowers yellow.

D. Plant glabrous, smooth; all the leaves entire, linear, the upper gland-tipped; pappus of 7—10 scales. U. (*Calycadenia truncata*.)

H. truncata Gray

DD. Plant hairy; basal or stem leaves pinnatifid, all spine-tipped.

E. Stem-leaves pinnatifid but those of the branchlets entire; pappus none. W. E.

H. pungens Torr.

EE. Stem-leaves entire, linear or subulate; pappus of 8—12 scales. U. E.

(*Centromadia fitchii*.) *H. fitchii* Gray

HEMIZONELLA

Annual; ours 2.5—15 cm. high, white-hairy, much branched. Leaves mostly opposite; in ours linear, about 1.2 mm. long, entire. Heads radiate, small, few-flowered; involucre-bracts herbaceous, as many as the ray flowers, each completely enclosing an akene, rounded on the back; receptacle-chaff forming an herbaceous 3—5-toothed cup enclosing the disk-flowers. Ray-flowers 4—5, pistillate, fertile, yellow, very short, glabrous or glandular. Disk-flower 1—2, perfect, fertile, yellow, glabrous or glandular. Akenes obovate or fusiform, flattish, slightly hairy. Pappus none. Dimniutive of *Hemizonia*, a related genus.) W. C. (*H. parvula*.)

H. durandii Gray

LAGOPHYLLA

Annual, slender, much-branched; ours 1.5—7.5 dm. high, hairy. Leaves entire; in ours mostly alternate, oblanceolate to linear-lanceolate, 2.5—5 cm. long. Heads radiate, small, several-flowered, in scattered clusters (ours); involucre-bracts as many as the rays—a few exterior ones (ours), herbaceous, infolded at margin, enclosing the ray-

akenes; receptacle flat, fimbriate-hirsute in the middle, chaffy between the ray- and disk-flowers; chaff in a single series of 5—6 distinct scales. Ray-flowers about 5, pistillate, fertile, yellow (ours), wedge-shaped, 3-cleft or -parted. Disk flowers 5—6, perfect, sterile, 5-lobed. Akenes cuneate-oblong, flattish, smooth. Pappus none. (Gk. lagos—a rabbit, phyllon—a leaf. Why?) E.

L. ramosissima Nutt.

LAYIA

Hairy, black-glandular, viscid above, 1—3 dm. high (ours). Leaves mostly alternate, in ours lanceolate to linear, entire to laciniately incised. Heads radiate, many-flowered, 1.5—2.5 cm. wide (ours); involucre-bracts as many as the rays, their margins thin and infolded on the ray akenes; receptacle wide, flat, with a series of thin chaffy bracts between ray- and disk-flowers. Ray-flowers 8—14 (ours), pistillate, fertile, white (ours), 3-toothed (ours): pappus none but replaced by a disk-like protuberance. Disk-flowers many, yellow, 5-lobed: pappus of 10—20 awns; awns equal, hairy below (ours). Akenes flattish or angular. (Origin?) E. (Apparently *L. douglasii*; *Blepharipappus glandulosus*.)

L. glandulosa Hook.

ACHRYACHAENA

Annual; ours villous-pubescent. Leaves alternate or the lowest opposite, narrowly linear, sessile, entire or the lowest lacinate. Heads radiate, many-flowered, terminal on the branches, 2.5 cm. or less long; involucre-bracts herbaceous; receptacle chaffy only between the ray- and disk-flowers. Ray-flowers 6—10, pistillate, fertile, yellow, little exceeding the disk-flowers, tube much exceeding the limb: pappus none. Disk-flowers perfect, fertile, yellow, 5-toothed: pappus of about 10 scales; scales silvery, blunt, in 2 series, outer 5 shorter. Akenes 10-ribbed, flattish to nearly terete. (Gk. achyron=chaff, achaino—an akene; probably on account of the chaff-like pappus.) U.

A. mollis ~~Shauer~~

HELENEAE (SNEEZE-WEED TRIBE)—Ours herbs. Heads in ours radiate or apparently rayless; involucre-bracts not scarious; receptacle naked except in *Gaillardia*. Ray-flowers usually fertile. Disk-flowers usually perfect, fertile, 4—5-toothed, tubular. Anthers not tailed at base. Style-branches of perfect flowers truncate or appendaged, not flat. Pappus none or chaffy or awns or bristles but the bristles not capillary.

A. Leaves opposite except sometimes the upper.

B. Leaves entire.

C. Plants of salt-marshes.

D. Pappus none; involucre-bracts not united.

JAUMEA (p. 405)

DD. Pappus of 5—10 chaffy scales; involucre-bracts united into a 5—15-toothed cup.

LASTHENIA (p. 405)

CC. Plants of dry soil, not of salt-marshes.

E. Involucre-bracts flat; receptacle conic to subulate.

BAERIA (p. 405)

EE. Involucre-bracts inrolled, receptacle flat.

RIGIOPAPPUS (p. 406)

BB. Leaves palmately 2—5-parted.

BAHIA (p. 406)

AA. Leaves alternate.

F. Heads radiate.

G. Receptacle not chaffy.

H. Akenes 4-angled; pappus-scales blunt or lacerate.

I. Involucre-bracts somewhat united; rays none or present; herbage floccose-woolly.

ERIOPHYLLUM (p. 405)

II. Involucre-bracts not united; rays none; herbage viscid-pubescent.

HULSEA (p. 406)

HH. Akenes 5—10-ribbed; pappus-scales acuminate or aristate.

J. Involucre-bracts erect.

ACTINELLA (p. 407)

JJ. Involucre-bracts spreading or reflexed.

HELENIUM (p. 407)

GG. Receptacle with bristle-like chaff.

GAILLARDIA (p. 407)

FF. Heads rayless.

K. Involucre-bracts with white or purplish tips.

HYMENOPAPPUS (p. 405)

KK. Involucre-bracts green to the tips.

L. Involucre-bracts somewhat united; corollas yellow. ERIOPHYLLUM (p. 405)

LL. Involucre-bracts not united; corollas yellow or white or flesh-colored.

CHAENACTIS (p. 406)

JAUMEA

Glabrous, in salt marshes. Leaves opposite, entire, fleshy, linear. Heads inconspicuously radiate, terminal, peduncled; involucre-bracts fleshy, membranous, the outer shortest; receptacle conic. Ray-flowers in ours 6—10, yellow, not exceeding the disk-flowers. Disk-flowers yellow. Akenes linear, 10-veined, somewhat angled. Pappus none (ours). (Honor of I. H. Jaume St. Hilare, a French botanist.) W.

*J. carnos*a Gray

BAERIA

GOLD FIELDS

Annual; ours 7.5—25 cm. high, strigose-pubescent. Leaves opposite, sessile, linear, entire (ours). Heads radiate, small, terminal, peduncled; involucre-bracts as many as ray-flowers; receptacle conic to subulate. Ray-flowers 5—15, pistillate, fertile, exceeding the disk-flowers, spreading, yellow, 0—3-toothed. Disk-flowers yellow, 5-lobed. Akenes narrowly club-shaped. Pappus in ours of 4—5 chaffy awns. (Honor of K. E. von Baer, a Russian botanist.) U. *B. aristosa* How.

LASTHENIA

Annual, glabrous, in salt marshes. Leaves opposite, entire, sessile. Heads radiate or rayless, small, terminal. Involucre-bracts in 1 series, united by their edges; receptacle conic. Ray-flowers yellow, often apparently none because so short or so little ligulate. Disk-flowers yellow, 4—5-lobed. Akenes linear to oblong, flattish, 0—3-veined, marginless. Pappus in ours of 5—10 awl-shaped chaffy scales. (Honor of Lasthenia, a pupil of Plato.) U. *L. glaberrima* DC.

HYMENOPAPPUS

Biennial or perennial; stem grooved-angled, erect. Leaves alternate, 1—3-pinnatifid (ours). Heads rayless, many-flowered; involucre-bracts 6—12, their tips scarious and usually colored. Flowers yellow to whitish yellow. Akenes obpyramidal, 4—5-angled, the faces 1—3-veined. Pappus none or of 10—20 scales (ours); scales obtuse, hyaline. (Gk. hymen=a membrane, pappos=pappus; because the pappus-scales are hyaline.) E. *H. filifolius* Hook.

ERIOPHYLLUM

WOOLLY SUNFLOWER

Floccose-woolly. Leaves alternate or partly opposite. Heads radiate or rayless, peduncled, many-flowered; involucre-bracts in 1—2 series, erect, oblong or narrower, green, united. Ray-flowers yellow, ligulate and distinct or so short that there is practically none. Disk-flowers yellow. Akenes narrowly club-shaped to cuneate-oblong, usually 4-angled. Pappus of chaffy blunt veinless scales. (Gk. erion=wool, phyllon=a leaf.)

A. Rays 1—3 mm. long. U. *E. stachadifolium* Lag.

AA. Rays 10—20 mm. long.

B. Akenes glabrous. W. C. E. (*E. caespitosum*; *E. achillaeoides*; *E. pedunculatum*.)
E. lanatum Forbes

BB. Akenes glandular. U. C. E. (*E. gracile*; *E. integrifolium*; *E. lanceolatum*.)
E. multiflorum Rydb.

RIGIOPAPPUS

Annual, small, slender. Leaves opposite. Heads small, inconspicuously radiate, terminal, many-flowered; involucre-bracts many, narrowly linear, herbaceous, involute; receptacle flat. Ray-flowers 5—15, yellow but in age often becoming purplish or whitish, entire or 2-toothed, not exceeding the disk-flowers. Disk-flowers 3—5-toothed, yellow. Pappus 0—5 scale-like (naked) awns. (Gk. *rigios*=stiff, *pappos*=pappus.) *E.*

R. leptocladus Gray

CHAENACTIS

Leaves alternate, entire to pinnately dissected. Heads rayless but the marginal flowers usually larger, solitary or cymose or corymbose, many-flowered; involucre-bracts linear, erect, equal, herbaceous; receptacle flat. Corolla short-toothed, yellow or white or flesh-color, marginal ones sometimes approaching rays. Akenes slender, pubescent. Pappus none or of veinless hyaline scales. (Gk. *chaînein*=to yawn, *aktis*=a ray; referring to the dilated marginal corollas.)

A. Heads corymbose or cymose.

B. Corollas yellow; plant merely puberulent. *E.*

C. nevii Gray

BB. Corollas white or flesh-color; plant somewhat floccose-woolly.

C. Leaves all entire; corollas white; pappus of 10 scales. *E.*

C. cusickii Gray

CC. Leaves 1—2-pinnatifid.

D. Pappus of 8—12 scales; corollas flesh-colored. *E.* (*C. douglasii achillaeifolia*.)
C. douglasii H. & A.

DD. Pappus of 4—5 scales; corollas white. *E.*

C. stevioides H. & A.

AA. Heads solitary; alpine; corollas flesh-colored. C. E. (*C. alpina*; *C. douglasii alpina*.)
C. nevadensis Gray

BAHIA

Leaves in ours opposite, except above, palmately 2—5-parted. Heads rayless or radiate, terminal, small or medium, many-flowered; involucre-bracts herbaceous, in 1—2 series, woolly; receptacle flat. Ray-flowers from none to conspicuous, yellow, in ours 5—6, oval, hardly exceeding the disk-flowers. Disk-flowers yellow. Akenes narrow, 4-angled. Pappus in ours of 4—8 scales. (Honor of J. F. Bahi, a Spanish botanist.)

E. *B. oppositifolia* Nutt.

HULSEA

Viscid-pubescent, balsam-scented. Leaves alternate; in ours mostly basal, the lower incised to pinnatifid. Head 1 (ours), radiate, large, many-flowered; involucre-bracts thin, herbaceous, in 2—3 series; receptacle flat. Ray-flowers many, yellow. Disk-flowers yellow. Akenes linear-cuneate, flattish or somewhat 4-angled, soft-villous. Pappus of 4 lacerate hyaline scales. *E.* (Honor of G. W. Hulse, a U. S. army surgeon.)

H. nana Gray

ACTINELLA

Low, perennial (ours). Leaves alternate, 1—2-ternately parted (ours); lobes narrow. Heads radiate (ours), peduncled, many-flowered; involucre-bracts in 2 or more series, often rigid, the outer sometimes united; receptacle conical to convex. Ray-flowers yellow, 4—10 mm. long, 3-toothed. Disk-flowers yellow. Akenes turbinate, 5—10-ribbed, villous or pubescent. Pappus-scales 5—12, thin, aristate, acuminate (ours). E. (Diminutive of Gk. *aktis*=a ray; probably because the rays are short.)

A. *richardsoni* Nutt.

HELENIUM

SNEEZE-WEED

Leaves alternate, simple. Heads radiate (ours), many-flowered, peduncled; involucre-bracts linear to subulate, herbaceous, spreading or reflexed, in 2 series; receptacle globose or hemispheric. Ray-flowers yellow, 3—5-toothed. Disk-flowers yellow, 4—5-toothed; teeth obtuse, glandular-pubescent. Akenes turbinate, 8—10-ribbed, hairy on the ribs. Pappus-scales 5—6, thin, scarious, acuminate or awn-pointed. (Said to be in honor of Helen of Troy, who used it cosmetically.)

A. Leaf-blades not decurrent on the stem. E. (*Dugaldia hoopesii*.)

H. *hoopesii* Gray

AA. Leaf-blades decurrent on the stem.

B. Leaves dentate; heads several to many. W. C. E. (*H. autumnale grandiflorum*.)

H. *autumnale* L.

BB. Leaves entire, head 1. U.

H. *bigelovii* Gray

GAILLARDIA

Erect, ours pubescent with jointed hairs. Leaves alternate, in ours entire to sinuate-pinnatifid. Heads radiate (ours), many-flowered, large, terminal, peduncled; involucre-bracts in 2—3 series, hirsute; receptacle convex to globose, setaceous-chaffy. Ray-flowers yellow, 3-toothed. Disk-flowers yellow or brown, 5-toothed; teeth with jointed hairs. Akenes villous, turbinate, 5-ribbed. Pappus-scales 5—10, hyaline, scarious, 1-veined, slender-awned (ours). (Honor of Gaillard de Merentonneau, a French botanist.) W. E.

G. *aristata* Pursh

ANTHEMEAE (SAGEBRUSH TRIBE)—Herbs or shrubs. Heads rayless or radiate; involucre-bracts imbricated, not foliaceous, rarely herbaceous, usually dry and scarious; receptacle naked or somewhat chaffy. Anthers not tailed at base. Style-branches of the perfect flowers truncate, sometimes obscurely conic-tipped. Akenes usually small and short. Pappus none or chaffy or scale-like or crown-like.

A. Herbs.

B. Rays present.

C. Rays 4—6, 4—6 mm. long; receptacle chaffy. ACHILLEA (p. 408)

CC. Rays 10 or more, 10 mm. or more long.

D. Receptacle chaffy at least toward its tip. ANTHEMIS (p. 408)

DD. Receptacle naked or merely hairy.

E. Leaf-segments terete or nearly so; receptacle conic.

MATRICARIA (p. 408)

EE. Leaf-segments plainly flat; receptacle flat to hemispheric.

CHRYSANTHEMUM (p. 409)

BB. Rays none.

F. Heads sessile in the leaf-axils or stem-forks.

SOLIVA (p. 409)

FF. Heads peduncled, either terminal on the branches or clustered.

G. Salt-marsh plants; leaves fleshy.

COTULA (p. 409)

GG. Not salt-marsh plants; leaves not fleshy.

H. Heads terminal on the leafy branches; receptacle conic.

MATRICARIA (p. 408)

HH. Heads in flat-topped leafless clusters; receptacle flat or hemispheric.

TANACETUM (p. 409)

HHH. Heads in bracted spikes or racemes or panicles, not in flat-topped clusters; receptacle flat to hemispheric.

ARTEMISIA (p. 410)

AA. Shrubs.

ARTEMISIA (p. 410)

ANTHEMIS

MAYWEED

Herbs, annual or perennial. Leaves alternate, pinnatifid or dissected. Heads large, radiate (ours); involucre-bracts imbricated in several series, scarious-margined, appressed, the outer shorter; receptacle convex to oblong, somewhat chaffy. Ray-flowers pistillate and fertile, or neutral, white or yellow, entire or 2—3-toothed. Disk-flowers perfect, fertile, yellow, 5-lobed. Akenes oblong, angled or ribbed. Pappus none or a mere border. (The Greek name.)

A. Rays white.

B. Leaves glabrous, with bad odor; rays neutral. W. E.

A. cotula L. (Dog Fennel)

BB. Leaves pubescent, without bad odor; rays fertile. W. E.

A. arvensis L. (Field Mayweed)

AA. Rays yellow; leaves somewhat tomentose. W.

A. tinctoria L. (Yellow Mayweed)

ACHILLEA

YARROW

Herbs, perennial; stems leafy, erect. Leaves alternate; in ours finely dissected into very many segments. Heads radiate, small, in corymbs, terminal on stem and branches; involucre narrow, its outer bracts shortest; receptacle chaffy, conic to oblong. Ray-flowers pistillate, fertile, short, wide, white to rose-colored. Disk-flowers few, inconspicuous, yellow. Akenes obcompressed, oblong or obovate, glabrous. Pappus none. (Honor of Achilles, who first used it as a vulnerary.) W. C. E. (*A. millefolium lanulosa*.)

A. millefolium L.

MATRICARIA

CAMOMILE

Herbs, annual. Leaves alternate, 2—3-dissected into narrow or filiform segments. Heads rayless or radiate, on peduncles; involucre hemispheric, the outer bracts shorter; receptacle conic or ovoid, naked. Ray-flowers pistillate, fertile, white; disk-flowers perfect, fertile, yellow; akenes 3—5-ribbed, glabrous, oblong. Pappus none (ours) or crown-like. (L. mater=mother, cara=dear; dear to mothers from reputed medicinal properties.)

A. Heads radiate.

B. Rays 20—30; pappus a crown, entire or 4-toothed; akenes obpyramidal, prominently 3-ribbed; herbage nearly odorless. W.

M. inodora L. (Scentless Camomile)

BB. Rays 10—20; pappus none; akenes oblong, faintly 3—5-ribbed; herbage sweet-scented. W. E.

M. chamomilla L. (Garden Camomile)

AA. Heads rayless. W. C. E. (*M. discoidea*; *M. matricarioides*.)

M. suaveolens Buch. (Pineapple Weed)

CHRYSANTHEMUM

CHRYSANTHEMUM

Herbs, our perennial. Leaves alternate, incised or dissected. Heads radiate, large; involucre hemispheric or flatter; its bracts oppressed, imbricated, the outer shorter; receptacle flat to hemispheric, naked. Ray-flowers pistillate, fertile, white. Disk-flowers perfect, yellow, 2-winged or terete, 4—5-toothed. Akenes 5—10-ribbed, terete, or the ray-akenes 3-angled. Pappus none or a toothed crown. (Gk. chrysos=gold, anthos=a flower; some species even have yellow rays.)

A. Heads 1—2 cm. wide, many, corymbose; rays 10—20, about twice as long as wide; pappus a toothed crown. E. *C. parthenium* Pers. (Fever-few)

AA. Heads 2.5—5 cm. wide, few, terminal; rays 20—30, 4 or more times as long as wide; pappus none. W. (*C. leucanthemum subpinnatifidum*.)

C. leucanthemum L. (Ox-eye Daisy)

SOLIVA

Herbs, ours 5—10 cm. high. Leaves alternate, pinnately dissected, petioled. Heads rayless, sessile in the leaf-axils or stem-forks, small, with 2 kinds of flowers; involucre-bracts 5—12, nearly equal, in 1—2 series; receptacle flat, naked. Outer flowers many, apetalous, pistillate, fertile. Central flowers perfect, mostly sterile; corolla yellowish-green, 2—6-lobed. Akenes obcompressed, 2-winged or -margined, the margins each spine-tipped at apex; style persistent, spine-like. Pappus none. (Perhaps *L. solus*=alone, *vagus*=wandering.) U. *S. sessilis* R. & P.

COTULA

Herbs, low. Leaves alternate, lobed or dissected. Heads rayless, many-flowered, peduncled, with 2 kinds of flowers; involucre hemispheric; its bracts greenish, in about 2 series; receptacle naked, flattish. Outer flowers pistillate, fertile, in 1—3 rows, apetalous; style deciduous. Inner flowers 4-toothed, yellow, perfect, fertile. Akenes pedicelled at maturity, obcompressed. Pappus none or a mere ring. (Gk. kotula=a small cup, referring to the hollow at the base of the clasping leaves.)

A. Herbage glabrous or very nearly so. W.

C. coronopifolia L. (Salt-marsh Butter-head)

AA. Herbage pubescent. *C. australis* Hook.

TANACETUM

TANSY

Herbs, perennial, aromatic. Leaves alternate, entire to dissected. Heads rayless, many-flowered, solitary or corymbose, with 1 or 2 kinds of flowers; involucre-bracts imbricated in 1 to few series; receptacle naked. Outer flowers when different pistillate, fertile, oblique or imperfectly ligulate. Inner flowers perfect, fertile, 3—5-toothed, regular. Akene 5-ribbed or 3—5-angled, with wide truncate tip; style deciduous. Pappus none or crown-like. (Said to be from Gk. athanatos=immortal; referring to the durable flowers.)

A. Leaves 2—5-lobed or parted, but some of the leaves may be entire.

B. Leaf-lobes linear. E. *T. capitatum* T. & G.

BB. Leaf-lobes not linear or none of the leaves lobed. E. (*T. canum*.)

T. nuttallii T. & G.

AA. Leaves pinnately-parted or -dissected into many segments.

C. Herbage quite pubescent.

D. Herbage silky with white hairs; heads many, 6—8 mm. wide. E.

T. potentilloides Gray

- DD. Herbage villous-pubescent; heads 1—8, 12—16 mm. wide. W.
T. huronense Nutt. (Seashore Tansy)
 CC. Herbage glabrous or very nearly so; heads many, 6—10 mm. wide. W.
T. vulgare L. (Garden Tansy)

ARTEMISIA

SAGEBRUSH

Herbs or shrubs, annual or perennial, bitter, aromatic. Leaves alternate. Heads rayless, small, many-flowered, paniculate when many, usually nodding; flowers of 1 or 2 kinds, white or yellowish; involucre-bracts imbricated in 2 or more series; receptacle naked or woolly. Outer flowers sometimes pistillate and inner flowers perfect, or all flowers perfect. Akenes obovate or oblong, usually with a small epigynous disk. Pappus none. (Honor of Artemisia, the wife of Mausolus.)

A. Shrubs.

- B. Plant spiny; akenes with long cobweb-like hairs. E.
A. spinescens Eat. (Bud-brush)
 BB. Plant not spiny; akenes without cobweb-like hairs.
 C. Leaves 3—5-cleft or -parted, the lobes linear; 2—6 dm. high.
 D. Heads usually solitary in the axils of ordinary leaves; panicle spike-like. E.
A. rigida Gray (Scab-land Sagebrush)
 DD. Heads clustered; panicle thyrsoid. E. (*A. tripartita*).
A. trifida Nutt.
 CC. Leaves entire to 3-toothed or -lobed, but the lobes not linear.
 E. Plant 1—3 dm. high; leaves entire to 3—5-lobed, the lobes cuneate, obovate. E.
A. arbuscula Nutt.
 EE. Plant 5—20 dm. high; leaves entire to 3-toothed, the teeth triangular. E.
 (*A. tridentata angustifolia*.) *A. tridentata* Nutt. (Common Sagebrush)
 AA. Herbs or merely shrubby at base.
 F. Leaves parted or dissected into oblong or linear segments.
 G. Leaves glabrous or nearly so.
 H. Leaf-lobes filiform, entire. E.
A. prescottiana Bess.
 HH. Leaf-lobes wider, lacinate or toothed. E.
A. biennis Willd.
 GG. Leaves pubescent.
 I. Receptacle woolly.
 J. Leaves silvery-pubescent, leaf-segments short, filiform. E.
A. frigida Willd. (Pasture Sagebrush)
 JJ. Leaves not silvery; leaf-segments oblong or linear-oblong. E.
A. absinthium L. (Wormwood)
 II. Receptacle not woolly.
 K. Heads 2—3 mm. wide.
 L. Plants 5—15 cm. high. E. *A. pedatifida* Nutt.
 LL. Plants 30—70 cm. high. E. *A. canadensis* Michx.
 KK. Heads 4—5 mm. wide. W. C. E. (*A. borealis wormskjoldii*).
A. borealis Pall.
 KKK. Heads 8—10 mm. wide. C. E. (*A. saxicola*).
A. longipedunculata Rud.
 GGG. Leaves tomentose at least on the lower surface.
 M. Involucre glabrous or nearly so. C. E. (*A. incompta*; *A. discolor incompta*.)
A. discolor Dougl.
 MM. Involucre densely pubescent or tomentose.

- N. Leaves with scattered fine white-resinous dots. E.
 A. atomifera Pip.
 NN. Leaves not resinous dotted. E.
 A. ludoviciana Nutt.
 FF. Leaves entire to cleft or lobed.
 O. Leaves glabrous or very nearly so on both sides.
 P. Herbage sweet-aromatic; 4—8 dm. high; branches not drooping; heads
 30—60-flowered. E. *A. aromatica* Nels.
 PP. Herbage not sweet-aromatic; 8—16 dm. high; branches drooping; heads
 15—20-flowered. E. *A. dracunculoides* Pursh
 OO. Leaves white-tomentose at least beneath.
 Q. Involucre persistently white-tomentose. (See MM.)
 QQ. Involucre glabrous to pubescent but green, not tomentose.
 R. Involucre cylindric; plant 9—15 dm. high. W. (*A. suksdorfii*)
 A. heterophylla Nutt. (Golden-rod Sage)
 RR. Involucre campanulate.
 S. Plant about 10 dm. high; involucre green. W. C. E.
 A. tilesii Ledeb.
 SS. Plant 3—6 dm. high; involucre gray-brown. E.
 A. lindleyana Bes.

SENECEAE (ARNICA TRIBE)—Herbs or shrubs. Heads rayless or radiate; involucre-bracts mostly in 1—2 series, usually equal, rarely scarious; receptacle naked (except sometimes hairy in *Arnica*). Anthers without tails at base tho often sagittate. Style-branches of perfect flowers usually truncate or obtuse, without appendages at tip or with short ones. Pappus of capillary bristles but often deciduous; bristles many, smooth to plumose.

- A. Herbs.
 B. Most of the leaves on each plant opposite. ARNICA (p. 412)
 BB. Leaves alternate or all basal.
 C. Leaves all basal.
 D. Scapes densely large-bracted; leaves wider than lanceolate, often more than
 10 cm. long; flowers white or pinkish. PETASITES (p. 412)
 DD. Scapes naked; leaves linear to oblanceolate, 2.5—10 cm. long; flowers
 yellow. RAILLARDELLA (p. 412)
 CC. Some leaves on the stem.
 E. Heads radiate.
 F. Annual; receptacle conic. CROCIDIUM (p. 413)
 FF. Perennial; receptacle flat. SENECIO (p. 414)
 EE. Heads rayless.
 G. Heads 4—10-flowered.
 H. Leaves entire, 1—2.5 cm. long; heads about 10-flowered.
 LUINA (p. 414)
 HH. Leaves coarsely dentate, 5—25 cm. long; heads 4—6-flowered.
 RAINIERA (p. 414)
 GG. Heads more than 10-flowered.
 I. Leaves palmately 5—9-lobed or -cleft or -parted, palmately veined.
 CACALIOPSIS (p. 413)
 II. Leaves entire to pinnately compound, not palmately veined.
 SENECIO (p. 414)
 TETRADYMIA (p. 414)
 AA. Shrubs.

PETASITES

COLT'S-FOOT

Herbs, perennial; rhizome thick, horizontal. Leaves all basal, pinnately or palmately veined, simple, alternate, long-petioled. Heads rayless or radiate, in a raceme or corymb, on large-bracted stems, appearing before the leaves, dioicous or somewhat so; involucre-bracts soft, herbaceous; receptacle flat. Pistillate flowers the outer when mixed with staminate; corolla irregular, 2—5-toothed to distinctly ligulate, white or purplish; style unbranched. Perfect but sterile flowers near center when mixed with pistillate, white or purplish, regular, 5-toothed; style branched. Akenes narrow, 5—10-ribbed. Pappus bristles soft, white, long. (Gk. petasos=a broad brimmed hat; referring to the leaves.)

- A. Leaves reniform-orbicular, 1.5—4 dm. wide, 7—11-cleft. W. E. (*P. palmata* for our region.) *P. speciosa* Pip. (Large Colt's-foot)
- AA. Leaves longer than wide, 0.5—2.5 dm. long.
- B. Leaves broadly sagittate, irregularly dentate to almost entire. E. (*P. dentata*.) *P. sagittata* Gray (Arrow-leaf Colt's-foot)
- BB. Leaves ovate or oblong, 5—7-lobed; alpine. W. C. E. (*C. nivalis*.) *P. frigida* Fries (Arctic Colt's-foot)

RAILLARDELLA

Herbs, acaulescent; rhizomes stout, creeping. Leaves basal, entire. Heads radiate or rayless, several- to many-flowered, solitary and terminal on simple naked scapes; involucre-bracts 6—14, linear, equal, in 1 series; receptacle flat or convex. Ray-flowers fertile, irregular, deeply 3—4-cleft, yellow. Disk-flowers regular, 5-toothed, yellow. Akenes linear, flattish, striate. Pappus-bristles rather stout, plumose. (Diminutive of *Raillardia*, another genus of Compositaceae.)

- A. Leaves glabrous, 5—10 cm. long; scapes 30—45 cm. high; heads radiate, about 40-flowered. C. *R. pringlei* Gr.
- AA. Leaves silvery-tomentose, 2.5—5 cm. long; scapes 5—10 cm. high; heads rayless, 7—20-flowered. U. C. E. *R. argentea* Gray

ARNICA

ARNICA

Herbs, perennial, erect. Leaves usually opposite. Heads rayless or radiate, many-flowered, rather large; involucre campanulate; its bracts several, thin-herbaceous, in 1—2 series, oblong-lanceolate to linear, equal; receptacle flat, villous or minutely fringed. Ray-flowers yellow, perfect. Disk-flowers yellow, perfect, 5-toothed. Akenes linear, somewhat 5—10-ribbed or angled. Pappus-bristles in 1 whorl, many, rather rigid, scabrous to barbellate. (Said to be from Gk. arnakis=a lamb's skin; referring to the softness of the heads.)

- A. Heads rayless.
- B. Involucre-bracts sparsely pubescent. U. C. E. *A. parviflora* Gray
- BB. Involucre-bracts densely villous.
- C. Basal leaves truncate to cordate at base. C. E. (*A. cordifolia eradiata*.) *A. discoidea* Benth.
- CC. Basal leaves cuneate or narrowed at base. W. C. E. (*A. spathulata*.) *A. parryi* Gray
- AA. Heads radiate.
- D. Basal leaves cordate to truncate at base.

- E. Herbage pubescent; stem hirsute or vilous. C. E.
A. cordifolia Hook.
- EE. Herbage glabrous or very nearly so.
- F. Akenes short-pubescent. N.
A. cernua How.
- FF. Akenes glabrous or almost so, sometimes glandular.
- G. Akenes with scattered glandular dots; leaves often glandular-dotted on both sides. C. E. *A. gracilis* Rydb.
- GG. Akenes glabrous or with a few hairs; leaves not glandular. W. C. E.
A. betonicaefolia.) *A. latifolia* Bong.
- DD. Basal leaves obtuse to narrowed at base.
- H. Leaves dentate or denticulate, mostly rather wide.
- I. Pappus whitish, barbellate.
- J. Herbage viscid-glandular; upper leaves much reduced.
- K. Stem-base corm-like, covered with reddish tomentum. C. E. (*A. alpina* for our region.)
A. pedunculata Rydb.
- KK. Stems from horizontal rootstocks. C. E.
A. fulgens Pursh
- JJ. Herbage not glandular or merely with minute glandular dots; upper leaves but little reduced. C. E. (*A. aurantiaca.*)
A. rydbergii Gr.
- II. Pappus gray-brown, somewhat plumose.
- L. Upper leaf-surface glabrous but sticky. W. C. E. (Probably *A. macouii.*) *A. amplexicaulis* Nutt.
- LL. Upper leaf-surface pubescent.
- M. Leaf-blade decurrent on the petiole. C. E. (*A. chamissonis* in part.)
A. mollis Hook.
- MM. Leaf-blade not decurrent on the petiole. C. E. (*A. aspera; A. chamissonis* in part.)
A. subplumosa Gr.
- HH. Leaves almost entire, rarely lanceolate.
- N. Herbage white-tomentose. C. E. (*A. cana.*)
A. foliosa Nutt.
- NN. Herbage glabrous or nearly so. C. E.
A. longifolia Eat.

CROCIDIUM

Herbs, annual. Leaves alternate. Heads radiate, many-flowered; involucre hemispheric or more open; its bracts 8—12, nearly equal, thin-herbaceous; receptacle conic. Ray-flowers about 12, oblong, perfect, yellow. Disk-flowers 5-toothed, yellow. Akenes fusiform-oblong, 3—5-ribbed, rough with hyaline oblong papillae. Pappus-bristles in 1 whorl, white, barbellate, very deciduous, usually none in the ray-flowers. (Gk. krokis—the nap or woolliness of cloth; the leaf-axils are hairy.) W. E.
C. multicaule Hook.

CACALIOPSIS

Herbs, perennial; ours 6—12 dm. high, floccose-woolly to glabrate. Leaves, in ours, alternate; palmately 5—9-lobed, long-petioled. Heads rayless, many-flowered; involucre-bracts sub-scarious, in 1 series, keeled, 1-veined; receptacle flat. Flowers perfect, fertile, 5-toothed, yellow. Akenes linear, glabrous, 10-striate. Pappus-bristles many,

soft, white, equaling the corolla. (*Cacalia* is a related genus, Gk. *opsis*=like; hence resembling *Cacalia*.) C. E. (*C. nardosmia glabrata*.)

C. nardosmia Gray

LUINA

Heads; stem simple, 1—3 dm. high. Leaves alternate, entire, ovate to oval, sessile 1—2.5 cm. long. Heads rayless, about 10-flowered, small, in a cyme; involucre-bracts 10—12, dry, equal, somewhat rigid, 1-veined, about 8 mm. high; receptacle flat. Flowers perfect, fertile, white or yellowish, 5-toothed. Akenes obscurely 10-striate, glabrous. Pappus-bristles many, white, equaling the corolla. (An anagram of *Inula*, another genus of Compositaceae.) W. C. E.

L. hypoleuca Benth.

RAINIERA

Herb, perennial, erect, 3—6 dm. high; juice milky. Leaves alternate, oblong, lanceolate, coarsely dentate, the basal 10—25 cm. long. Heads rayless, 4—6-flowered, in a raceme, 2—3 in the axil of each small bract; involucre-bracts 4—10, in 1 series, erect, firm, purplish; receptacle flat. Flowers perfect, fertile, yellowish, with 5 linear lobes. Akenes glabrous, prismatic. Pappus-bristles brownish or grayish, slightly scabrous at apex. (From Mt. Rainier, where it was first found.) C.

R. stricta Gr.

TETRADYMIA

Shrubs, rigid, low. Leaves alternate or fascicled, entire, narrow. Heads rayless, scattered or cymose or clustered; involucre cylindric or oblong, bracts 4—6; receptacle flat. Flowers yellow, 5-lobed; lobes lanceolate to linear. Akenes terete, short, obscurely 5-veined. Pappus-bristles fine, long, soft, white or whitish, minutely scabrous. (Gk. *tetradymos*=4-fold; because many species have just 4 flowers in a head.)

A. Plant with spines subtending the leaf-fascicles.

B. Leaves of the fascicles about 6 mm. long; heads 5—9-flowered, scattered. E.

T. spinosa H. & A.

BB. Leaves of the fascicle about 12 mm. long; heads 4-flowered, in cymose clusters.

E. *T. nuttallii* T. & G.

AA. Plant without spines; heads 4-flowered.

C. Leaves green when old through shedding of the white hair, those subtending the leaf-fascicles narrowly subulate. E.

T. glabrata Gray

CC. Leaves permanently white-hairy, linear to spatulate-lanceolate. E.

T. canescens DC.

SENECIO

RAG-WORT

Herbs, perennial; stem simple in most. Leaves all alternate. Heads radiate or rarely rayless, 1 to many on a stem, peduncled, many-flowered; involucre-bracts naked at base, equal, in 1—2 series, sometimes with a few calyx-like ones outside; receptacle flat. Ray-flowers pistillate, yellow. Disk-flowers 5-lobed, yellow. Akenes linear, 5-angled or 5—10-ribbed, glabrous to hairy. Pappus-bristles capillary, scabrous to barbate, in 1 whorl. (L. *senex*=an old man; referring to the ripe heads white with pappus.)

A. None of the leaves pinnate nor pinnatifid.

AA. Some of the leaves pinnate or pinnatifid.

GROUP 1 (p. 415)

GROUP 2 (p. 416)

GROUP 1

- A. Stems always almost equally leafy to the top, mostly clustered.
- B. Heads 16—25 mm. high. E.
S. megacephalus Nutt.
- BB. Heads 8—12 mm. high.
- C. Stems 1—3 dm. high.
- D. Leaves orbicular to obovate, 2.5—4 cm. long. E.
S. streptanthifolius Gr.
- DD. Most of the leaves narrower than obovate, 1—2.5 cm. long.
- E. Leaves entire to crenately few-toothed. U.
S. hesperius Gr.
- EE. Leaves or some of them sharply toothed to pinnatifid-dentate. W. C.
E. (*S. occidentalis*; *S. ductoris*).
S. fremontii T. & G.
- CC. Stems 4—10 dm. high.
- F. Leaves sessile; the blade lanceolate.
- G. Leaf-margin evenly serrate. E.
S. serra Hook.
- GG. Leaf-margin entire. C. E. (*S. serra integriusculus*).
S. serra lanceolatus Pip.
- FF. Leaves petioled; the blade triangular-lanceolate, coarsely dentate.
- H. Herbage nearly glabrous. W. C. E. (*S. gibbonsii*).
S. triangularis Hook.
- HH. Herbage densely floccose-woolly. W. C. E. (*S. subvestitus*).
S. triangularis subvestitus Greenm.
- AA. Stems either few-leaved or the upper leaves reduced in size, usually solitary.
- I. Herbage wholly glabrous.
- J. Leaves glaucous, mostly entire. C. E. (*S. hydrophyllus* of How. Fl.)
S. hydrophilus Nutt.
- JJ. Leaves not glaucous, mostly dentate.
- K. Involucre-bracts 6—7 mm. long, straw-colored. C. E.
S. hydrophiloides Rydb.
- KK. Involucre-bracts 7—8 mm. long, brownish. C. E.
S. foetidus How.
- II. Herbage somewhat hairy.
- L. Heads rayless. C. E.
S. vaseyi Greenm.
- LL. Heads radiate.
- M. Herbage permanently white-tomentose.
- N. Plant 1—3 dm. high; lowest leaves entire. E. (*S. altus*).
S. lugens Rich.
- NN. Plant 6—10 dm. high; lowest leaves somewhat dentate. E. (*S. howellii*; *S. canus purshianus*; *S. purshianus*).
S. canus Hook. (Silvery Rag-wort)
- MM. Herbage often tomentose when young but becoming glabrate.
- O. Heads in a dense cluster, 3—6. E.
S. condensatus Gr.
- OO. Heads in a loose cluster, usually more than 6.
- P. Involucre-bracts about 13. W. C. E. (*S. exaltatus ochraceus*; *S. cordatus*; *S. glaucescens*).
S. exaltatus Nutt.
- PP. Involucre-bracts about 21. E. (*S. columbianus*).
S. atriapiculatus Rydb.

GROUP 2

- A. Herbage densely white-woolly or floccose at least when young, this usually persistent.
- B. Leaves lyrate-pinnatifid. E.
 - S. uintahensis* Nels.
- BB. Leaves not lyrate pinnatifid.
- C. Leaves on the same plant 1—2 cm. wide.
- D. Leaves entire to distinctly dentate or even lobed on the same plant; upper leaf-surface often glabrate. E. (*S. howellii*; *S. canus purshianus*; *S. purshianus*.)
 - S. canus* Hook. (Silvery Rag-wort)
- DD. Leaves entire or sparingly dentate; upper leaf-surface usually permanently woolly. W. E. (*S. fastigiatus macounii*.)
 - S. fastigiatus* Nutt.
- CC. Leaves on the same plant 1—5 cm. wide.
- E. Involucre-bracts conspicuously black-tipped. C. E.
 - S. elmeri* Pip.
- EE. Involucre-bracts not conspicuously black-tipped. W. (*S. altus*.)
 - S. lugens* Rich.
- AA. Herbage not densely white-woolly, pubescence mostly at stem-base and leaf-axils.
- F. Heads rayless.
- G. Annual. W. E. A. *vulgaris* L. (Common Groundsel)
- GG. Perennial.
- H. Stem-leaves deeply parted. W. E.
 - S. pauciflorus* Pursh
- HH. Stem-leaves entire to dentate, or rarely some of them parted. C. E. (*S. elongatus*.)
 - S. cymbalarioides* Nutt.
- FF. Heads radiate.
- I. Heads 1—2 on a stem.
- J. Stem-leaves bract-like. C. E. (*S. valerianella*.)
 - S. subnudus* DC.
- JJ. Stem-leaves wide and somewhat clasping, closely pectinate. C.
 - S. ovinus* Gr.
- II. Heads few to many on a stem, rarely only 1—2 on dwarfed forms.
- K. Akenes hispidulous on the angles. W. E.
 - S. balsamitae* Muhl. (Pop-soda Plant)
- KK. Akenes glabrous.
- L. Leaves entire to shallowly pinnatifid, but not more deeply dissected.
- M. Basal leaves gradually narrowed to the petiole.
- N. Stems 1—3 dm. high; upper stem-leaves auricled. E.
 - S. rydbergii* Nels.
- NN. Stems 3—9 dm. high; upper stem-leaves not auricled. W.
 - S. oreganus* How.
- MM. Basal leaves abruptly contracted to the petiole.
- O. Basal leaves obovate or oblanceolate, dentate only toward the apex. (See HH.)
- OO. Basal leaves crenate-dentate from base to apex or nearly entire. C.
 - S. fraternus* Pip.
- LL. Some of the leaves pinnately divided or more deeply lobed.
- P. Pubescence of crisp hairs.
- Q. Plant leafy to the inflorescence; leaves thin. W. C. E.
 - S. harfordii* Greenm.
- QQ. Plant not leafy above; leaves thick. W.
 - S. flettii* Weig.

- PP. Pubescence of woolly hairs.
 R. Basal leaves ovate or wider, the base cordate.
 S. Rays 5—8. W.
 S. bolanderi Gray
 SS. Rays 8—12.
 T. Basal leaves cordate-orbicular to reniform. C. E.
 S. aureus L. (Golden Rag-wort)
 TT. Basal leaves cordate-ovate. C. E.
 S. pseudoreus Rydb.
 RR. Basal leaves narrower than ovate.
 U. Plant not floccose-woolly below; rays 10—12; involucre-bracts slightly purplish-tipped. W.
 S. pauciflorus fallax Greenm.
 UU. Plant floccose-woolly below; rays 12—15; involucre-bracts not purplish-tipped. C.
 S. adamsi How.

CYNAREAE (THISTLE TRIBE)—Herbs. Leaves alternate. Heads rayless; involucre much imbricated; receptacle flat or convex, naked or bristly or chaffy. Flowers perfect or the other neutral. Corolla equally or unequally 5-cleft. Anthers tailed at base. Style unbranched or the branches appendaged. Akenes rather thick, hard. Pappus none or chaff or stiff bristles or capillary bristles, simple or plumose.

- A. Involucre-bracts hooked at tip; leaves not spiny. ARCTIUM (p. 417)
 AA. Involucre-bracts not hooked at tip.
 B. Leaves not spiny.
 C. Pappus at least partly of plumose bristles.
 D. Leaves entire or dentate; heads 1—3 cm. wide. SAUSSUREA (p. 418)
 DD. Leaves pinnatifid; heads 5—10 cm. wide. CYNARIA (p. 419)
 CC. Pappus none or of simple bristles or scales. CENTAUREA (p. 419)
 BB. Leaves somewhat spiny and often also the involucre.
 E. Pappus distinctly plumose.
 F. Heads 1—5 cm. wide; involucre-bracts not fleshy; akenes not ribbed.
 CARDUUS (p. 418)
 FF. Heads 5—10 cm. wide; involucre-bracts fleshy; akenes slightly ribbed.
 CYNARIA (p. 419)
 EE. Pappus none to barbellate or fimbriate.
 G. Heads 6—7 cm. wide; leaves green and blotched with white.
 SILYBUM (p. 419)
 GG. Heads 2—4 cm. wide; leaves not white-blotched.
 H. Heads not subtended by bristly leaves. CENTAUREA (p. 419)
 HH. Heads subtended by bristly leaves, sessile. CNICUS (p. 420)

ARCTIUM

BURDOCK

Biennial, tall, coarse. Leaves not prickly, petioled, blades in ours broadly ovate, cordate at base, 2—5 dm. long. Heads racemose or corymbose or paniculate, involucre globose; its bracts appressed at base, spreading and hooked at tip, in several series; receptacle densely bristly. Flowers perfect. Filaments glabrous, distinct. Akenes glabrous, oblong, flattish, transversely wrinkled. Pappus-bristles short, many, rough, distinct, deciduous, in 1 whorl. (Gk. *arktos*=a bear, from the rough involucre.)

- A. Heads racemose, 1.5—3 cm. wide. W.
 A. minus Schk. (Common Burdock)

- AA. Heads corymbose, 2—5 cm. wide. W.
A. lappa L. (Great Burdock)

SAUSSUREA

SAW-WORT

Ours 6—18 dm. high. Leaves not prickly. Heads medium-sized, many-flowered; involucre-bracts imbricated, in 4—9 series (ours), blunt, obtuse, unappendaged; receptacle naked or chaffy. Flowers perfect, 5-cleft, blue or pink or purple, the outer filaments glabrous, distinct. Akenes glabrous. Pappus of 2 whorls of bristles, the outer rigid, short, denticulate, the inner plumose. (Honor of H. B. de Saussure, a Swiss botanist.) W. C. E.

S. americana Eat.

CARDUUS

THISTLE

Stout, erect. Leaves somewhat prickly, pinnately-veined and often -lobed. Heads rayless, large or medium, all alike (or dioicous in *A. arvensis*), many-flowered; involucre cylindric to globose; its bracts mostly narrow, in several series, often spiny. Receptacle flat, fleshy, densely bristly. Flowers perfect, fertile, white to red or rarely yellowish. Filaments distinct, usually hairy. Akenes glabrous, obovate or oblong, somewhat flat-tish, attached at very base. Pappus-bristles many, rather rigid, plumose, long, in 1 whorl, united into a ring at base. (The Latin name; said to be from Celtic ard=a sharp point.)

- A. Perennial by spreading horizontal rootstocks; heads 15—25 mm. high, dioicous. W. E.

C. arvensis Robs. (Canada Thistle)

- AA. Biennial; heads larger, all alike.

- B. None of the involucre-bracts spine-tipped, all with dilated fringed tips. W. E.

A. americanus Gr.

- BB. Outer involucre-bracts spine-tipped, inner ones not.

- C. Involucre-bracts not at all glandular on the back.

- D. Involucre-bracts either nearly equal or some with spreading herbaceous tips.

- E. Flowers cream-colored. W. C. E.

C. remotifolius Hook.

- EE. Flowers white to red.

- F. Plant very white-woolly. U.

C. occidentalis Nutt.

- FF. Plant densely pubescent to glabrate.

- G. Inner involucre-bracts with dilated tips. E.

C. magnificus Nels.

- GG. None of the involucre-bracts with dilated tips.

- H. Herbage pubescent, grayish or green; leaves weakly prickly; 10—30 dm. high. W. C. E.

C. edulis Gr. (Edible Thistle)

- HH. Herbage glabrate, green; leaves strongly prickly; 6—9 dm. high. E.

C. hallii How.

- DD. Involucre-bracts much shorter outward, appressed.

- I. Heads oblong or cylindric; inner involucre-bracts purplish. E.

C. andersoni Gr.

- II. Heads wider; inner involucre-bracts not or very slightly purplish.

- J. Stem somewhat woolly; inner involucre-bracts somewhat dilated. E.

C. foliosus Hook.

- JJ. Stem glabrous; inner involucre-bracts not at all dilated. E.

C. drummondii Cov.

- CC. Involucre-bracts with glandular ridge or spot on the back.

- K. Outer involucre-bracts with spines nearly equalling the body. E.
C. ochrocentrus Gr. (Yellow-spined Thistle)
- KK. Outer involucre-bracts with spines distinctly shorter than the body.
 L. Leaves canescent on both sides.
 M. Heads 3—4 cm. high. E.
C. undulatus Nutt.
 MM. Heads 6—8 cm. high. E. (*C. megacephalus*.)
C. undulatus megacephalus Gr.
 LL. Leaves green above.
 N. Leaves conspicuously prickly. E.
C. breweri Gr.
 NN. Leaves with few prickles. E.
C. palousensis Pip.
- BBB. All the involucre-bracts spine-tipped. W. E.
C. lanceolatus L. (Bull Thistle)

CYNARIA

Plant 1—2 m. high (ours); growing about abandoned gardens. Leaves in ours pinnatifid, thinly white-woolly, 3—5 dm. long, mostly basal. Heads rayless, all alike, very large; involucre flat, wide, imbricated in several series, fleshy, often spine-tipped; receptacle bristly. Flowers white or blue or purple. Akenes beakless. Pappus plumose. (Gk. *kyon*=a dog; the involucre-spines suggest dog-teeth.) W.

C. scolymus L. (Artichoke)

SILYBUM

MILK THISTLE

Annual or biennial, ours 6—12 dm. high. Leaves clasping, sinuate-lobed to pinnatifid, white-blotched, prickly. Heads rayless; involucre depressed-globose; its bracts prickly at margin, with spreading spine at tip, in many series; receptacle densely bristly. Flowers perfect, purplish, deeply 5-cleft. Filaments united below, glabrous. Akenes oblong-obovate, flattish, glabrous, with a papillose ring at tip. Pappus-bristles in 2 or more whorls, barbellate (ours), white. (Gk. *silybos*=the name of a thistle with edible stem.) W. E.

S. marianum Gaert. (Lady's Thistle)

CENTAUREA

STAR THISTLE

Annual or perennial. Heads many-flowered; flowers all tubular but the the marginal ones often much larger and sterile; involucre ovoid or globose, the bracts margined or appendages; receptacle bristly. Marginal flowers sometimes suggesting rays, color various. Akenes obovoid or oblong, flattish or 4-angled, with ring at tip, oblique attached. Pappus none or of bristles or of scales. (It is said that the centaur Chiron cured his wounded foot with these.)

A. Involucre-bracts spine-tipped.

B. Stem not winged; corollas purplish; pappus none. W.
C. calcitrapa L. (Caltrops)

BB. Stem winged; corollas yellow; pappus of unequal bristles or scales. W.
C. meltensis L. (Tocalote)

AA. Involucre-bracts not spine-tipped.

C. Annual; pappus of unequal bristles; corollas white or red or blue or violet. E.
C. cyanus L. (Blue-bottle)

CC. Perennial; pappus none; corollas red. E.
C. consimilis Bor.

CNICUS

BLESSED THISTLE

Annual. Leaves sinuate to pinnatifid, prickly. Heads large, sessile, solitary and terminal on the branches; involucre-bracts imbricated in several series, ovate to lanceolate, tipped by a pinnately branched spine; receptacle bristly. Flowers light yellow (ours), not greatly different, the outer ones sterile. Akene terete, striate, laterally attached, 10-toothed at tip with 10 minute teeth forming an inner ring. Pappus of awns, in 2 whorls, the outer naked and the larger, the inner, fimbriate. (Gk. kniso—to prick.) U. E.

C. benedictus L.

CICHOREAE (DANDELION TRIBE)—Herbs (ours), nearly always with milky or acrid juice. Leaves alternate, often all basal. Heads involucre; receptacle flat or nearly so. Flowers all alike, perfect. Corolla strap-shaped, white or yellow or pink or blue or purple, truncate but nearly always 5-toothed at apex. Anthers sagittate-auriculate but not caudate at base. Style branches filiform, minutely papillose, not appendaged.

A. Flowers yellow or orange or saffron-colored.

B. Pappus none; stem leafy, branched; flowers in panicles; akenes 20—30-striate.

LAPSANA (p. 421)

BB. Pappus scale-like or of bristles which have a scale-like base; akenes not beaked.

C. Pappus of 4—10 scales or bristles, simple or plumose when bristles.

D. Pappus of 4—10 bristles each arising as a continuation of an unforked scale-like or enlarged base; heads erect.

E. Annual; heads nodding; involucre bracts all nearly equal except for a few very small ones outside.

MICROSERIS (p. 422)

EE. Perennial; heads erect; involucre scales gradually shorter in successive whorls.

SCORZONELLA (p. 422)

DD. Pappus of 5 bristles each arising from the fork of a 2-toothed scale-like base; heads nodding; annual.

UROPAPPUS (p. 422)

CC. Pappus of 15—40 scales or bristles, not plumose altho in some barbellate or approaching plumoseness near base.

F. Stems 5—25 cm. high, leafy; pappus bristles plumose, 15—20; leaves entire to pinnatifid; young heads nodding.

PTILOCALAIS (p. 423)

FF. Stem none; pappus bristles not plumose, 20—50 leaves entire or wavy; young heads always erect.

NOTHOCALAIS (p. 423)

BBB. Pappus of bristles without a widened scale-like base.

G. Bristles of the pappus plumose.

H. Bristles of the pappus plumose to near the tip; perennial.

I. Leaves stiffly-hairy on both sides; receptacle chaffy; akene long-beaked.

HYPOCHAERIS (p. 424)

II. Leaves glabrous or thinly soft-hairy; receptacle naked; akene beakless or nearly so.

LEONTODON (p. 424)

HH. Bristles of the pappus plumose only near the base; akenes beakless; annual.

MALACOTHRIX (p. 425)

GG. Bristles of the pappus not plumose.

J. Plants acaulescent; leaves all basal; flowers solitary on leafless bractless unbranched scapes.

K. Leaves entire or merely obscurely wavy; scape only 1; heads nodding in bud; mature akene beakless, truncate.

SCORZONELLA (p. 422)

KK. Leaves or some of them lobed or pinnatifid; scapes 1 or more; head erect in bud; mature akene beaked or attenuate.

L. Chief involucre bracts imbricated in one series; akenes spinulose at the apex, long-beaked.

TARAXACUM (p. 425)

- LL. Chief involucre bracts in several series; akenes smooth at apex, attenuate or long-beaked. AGOSERIS (p. 427)
- JJ. Plants with evident stems; stems simple or branched, leafy or bracted; flowers 1 or more on a stem.
- M. Akenes terete or 4—5-angled, not flat.
- N. Pappus of an inner whorl of bristles, and an outer whorl of short teeth with 0—8 bristles among them, inner whorl deciduous; annual. MALACOTHRIX (p. 425)
- NN. Pappus of bristles only and no teeth, persistent; annual or perennial.
- O. Pappus white; akenes somewhat narrowed at tip; leaves entire to Dandelion-like in their lobing. CREPIS (p. 428)
- OO. Pappus tawny or in a few almost white akenes rarely narrowed at tip; leave entire to shallowly toothed but not Dandelion-like. HIERACIUM (p. 429)
- MM. Akenes somewhat flat.
- P. Akenes beakless, truncate, heads 50-flowered or more. SONCHUS (p. 425)
- PP. Akenes beaked or attenuate, heads 6—30-flowered. LACTUCA (p. 426)
- AA. Flowers white or pink or blue or purple; stems leafy or bracted.
- Q. Pappus a crown of short blunt scales; heads sessile or nearly so, in spikes or racemes. CICHORIUM (p. 422)
- QQ. Pappus of simple bristles tho often scabrous.
- R. Flowers white; leaves and lower part of stem with long white stiff spreading hairs; leaves lanceolate to oblong, entire. HIERACIUM (p. 429)
- RR. Flowers not white; plant without long white stiff spreading hairs; leaves usually not as described above.
- S. Leaves entire, lanceolate or narrower, not sagittate at base; flowers rose-colored or pink; akene terete, neither flat or angled. LYCODESMIA (p. 426)
- SS. Leaves either not entire or else sagittate at base; flowers pink or blue or purplish; akene terete or 4—5-angled or somewhat flat.
- T. Akene terete or 4—5-angled, not flat; pappus tawny; leaves deltoid-hastate but becoming narrower up the stem; plant 3—6 dm. high. NABALUS (p. 429)
- TT. Akene somewhat flat; pappus white; leaves several times as long as wide; plant usually taller. LACTUCA (p. 426)
- QQQ. Pappus of plumose bristles.
- U. Heads solitary and terminating a leafy stem, 5—10 cm. wide; leaves all entire; akene with long slender beak; flowers purple. TRAGOPOGON (p. 425)
- UU. Heads in panicles or corymbs, 2.5 cm. or less wide; mostly with at least the basal leaves not entire; flowers pink or white.
- V. Akene tapering into a slender beak as long as the body; involucre 18—25 mm. high, 15—30-flowered. REFINESQUIA (p. 424)
- VV. Akene truncate, beakless; involucre 6—15 mm. high, 3—6-flowered. PTILORIA (p. 424)

LAPSANA

NIPPLE-WORT

Annual, erect; stem leafy, branched. Leaves entire to pinnatifid in ours. Heads small, in panicles, on slender peduncles; involucre-bracts chiefly in 1 series, nearly equal, a few smaller ones outside; receptacle naked. Flowers yellow. Akenes obovate-oblong,

20—30-veined, flattish, narrowed at base, rounded at tip. Pappus none. (The Greek name of some plant of the Cruciferae.) W. E.

L. communis L.

CICHORIUM

CHICORY

Perennial (ours), erect; stem branched. Leaves entire to runcinate-pinnatifid in ours, largely basal; stem leaves usually small and bract-like. Heads 25—40 mm. wide (ours), sessile or peduncled, spike-like in arrangement (ours); involucre-bracts in 2 series, herbaceous; outer bracts somewhat spreading; inner bracts erect, subtending or partly enclosing the outer akenes; receptacle naked or minutely fringed. Corolla in ours white or blue. Akenes 5-angled or -ribbed, truncate, not beaked. Pappus of 2—3 series of short blunt scales. (From its Egyptian name, chikouryeh.) W.

C. intybus L.

MICROSERIS

Annual, acaulescent or with short stem 3 dm. or less high (ours). Leaves entire or laciniately lobed or pinnatifid. Heads small, nodding, on slender peduncles; chief involucre-bracts in 1—2 series, equal, thin, membranous-margined, with a few very short ones outside. Corolla yellow. Akene terete, 8—10-ribbed, with a wide basal thickening which is hollowed at the insertion and produced upward into a sharp denticulate collar-like rim. Pappus of scales terminating each in an awn; scales 4—10, usually 5, mostly short, tapering above; awn scabrous, long or short. (Gk. micros=small, seris=chicory.)

A. Leaves linear to spatulate; chief bracts of the involucre obtuse; akene contracted under the tip; scale-like base of the pappus ovate. U.

M. douglasii Gray

AA. Leaves linear to lanceolate; chief bracts of the involucre acute or acuminate; akene not contracted under the tip; scale-like base of the pappus oblong to lanceolate. U.

M. bigelovii Gray

UROPAPPUS

Annual, with short branched stem. Leaves laciniately lobed or pinnatifid. Heads erect; peduncles scape-like, long, thickened above; involucre-bracts imbricated in 2 or more series, thin, scarious-margined, the outer successively shorter; receptacle somewhat chaffy in the center. Corolla yellow. Akenes black (ours), terete, 8—10-ribbed, glabrous with scabrous ribs, the basal callosity not angled. Pappus of chaffy scales; scales 5, 2-toothed, elongated, flat, hispid, short-awned at tip. (Gk. oura=a tail, pappos=pappus; because the pappus-scales are awned.) E. (*U. macrochaetus*.)

U. linearifolius Gr.

SCORZONELLA

Biennial (ours), glabrous; roots fusiform. Leaves entire to laciniately pinnatifid. Heads 1 or rarely few on a peduncle; peduncles long, scape-like; involucre-bracts herbaceous, imbricated, in several series, the inner long-acuminate, the outer shorter and acute. Corolla yellow. Akene linear or somewhat turbinate, smooth or 8—10-ribbed or -striate, truncate. Pappus in ours of 5 or 10 bristles or awns which are dilated into scale-like bases (except in *S. borealis*); scale deltoid to linear-lanceolate; awn straight, scabrous to plumose. (Diminutive of *Scorzonera*, another genus of Compositaceae.)

- A. Leaves all basal, entire or merely wavy.
- B. Pappus of copious bristles; most of the bristles barbellate-denticulate; akene smooth. C. (*Apargidium boreale*).
S. borealis Gr.
- BB. Pappus of 10 scales with awn tips; awns minutely plumose, several times as long as the scales; akene 8—10-ribbed or -striate. U.
S. pratensis Gr.
- AA. Leaves not all basal, at least 1 on the elongated stem; akene 8—10-ribbed or striate.
- C. Awns of the pappus-scales 3 or more times as long as the scales; peduncles 1-flowered.
- D. Scale-like base of the pappus awns less than half as long as the akenes.
- E. Pappus awns 3—5 times as long as their scale-like base; attenuate into awns. W. C. S. leptosepala Nutt.
- EE. Pappus awns 6—9 times as long as their scale-like base.
- F. Pappus-scales lanceolate; attenuate-awned. W.
S. procera Gr.
- FF. Pappus-scales deltoid or ovate-triangular, bluntly-awned. W. C.
S. laciniata Nutt.
- DD. Scale-like base of the pappus-awns about as long as the akenes; scales abruptly awned. W. S. bolanderi Gr.
- CC. Awns of the pappus-scales about as long as the scales; peduncles 1—3-flowered. U.
S. howellii Gr.

PTILOCALAIS

Biennial, glabrous; root fusiform; stem leafy. Leaves entire to pinnately parted. Peduncles long; involucre-bracts imbricated in several series, inner long acuminate, outer shorter and acute. Corolla yellow. Akenes linear-columnar. Pappus clear white, soft, of 15—20 bristles or awns which are dilated below into scale-like bases; scales truncate or emarginate; awns long, soft-plumose, capillary. (Gk. ptilon=a feather, *Calais* is an old genus of Compositaceae.)

- A. Leaves spatulate-obovate or much lobed; involucre-bracts of an inner whorl and a few short calyx-like ones outside. C. E.
P. nutans Gr.
- AA. Leaves oblong-lanceolate or much lobed; involucre bracts distinctly of 3 lengths from inside outward. E. P. major Gr.

NOTHOCALAIS

Perennial, acaulescent. Leaves linear or lanceolate, in ours entire or undulate. Heads erect; involucre-bracts in 2 series, narrowly lanceolate, membranous, with somewhat thinner hyaline margins, nearly equal. Corolla yellow. Akene fusiform, stipitate, contracted to attenuate-beaked at tip, 10-ribbed. Pappus of chaffy scales and capillary bristles; scales very white and soft, 20—50, narrow, scabrous-margined, unequal. (Gk. nothos=spurious, *Calais* is an old genus of Compositaceae.)

- A. Pappus of 20—40 scales and bristles. E. (*N. suksdorfii*; *N. nigrescens*).
N. troximoides Gr.
- AA. Pappus of 40—50 scales and bristles. E.
N. cuspidata Gr.

HYPOCHAERIS

CAT'S-EAR

Perennial; stems scapose, branched. Leaves basal, tufted; in ours entire, oblanceolate; stem-leaves mere scales or bracts. Heads long-peduncled, paniculate, large; involucre-bracts herbaceous, imbricated in several series, appressed, the outer smaller; receptacle chaffy. Corolla yellow. Akenes oblong to linear, 10-ribbed, somewhat narrowed below, contracted above into a long or short beak. Pappus of 1 row of plumose bristles, sometimes with some shorter simple ones. (Gk. hypo=under, chaeris=young pigs; because pigs like the roots.) W. C.

H. radicata L.

LEONTODON

HAWK-BIT

Perennial; stems scapose, in ours branched and bracted. Leaves basal, tufted, mostly pinnatifid. Heads large, solitary at the ends of the branches (ours); chief involucre-bracts in 1—2 series, equal, also several series of short outer bracts. Corolla yellow. Akenes oblong or linear, finely striate, contracted or beaked at the summit. Pappus of bristles; bristles plumose, brownish, persistent, in 1—2 series, somewhat widened at base. (Gk. leon=a lion, odous=a tooth; referring to the leaf-teeth.) W.

L. autumnale L. (Fall Dandelion)

PTILORIA (*Stephanomeria*)

Annual or perennial, glabrous. Leaves often basal, entire to pinnatifid; branch-leaves often scale-like. Head small, erect, paniculate or solitary at the branch-tips, opening mornings; chief involucre-bracts equal, few, scarious-margined, slightly united at base, often with some shorter ones on the outside; receptacle naked. Corolla pinkish. Akenes oblong or linear, terete or columnar, 5-ribbed, truncate or beaked at summit; ribs smooth or rugose. Pappus of 1 series of rather rigid plumose bristles. (Gk. ptilon=a feather; referring to the plumose pappus.)

A. Pappus gray-brown, plumose to the base; annual. E.

P. paniculata Gr.

AA. Pappus white.

B. Hairs of the pappus plumose to the base or nearly so.

C. Annual; lower leaves often merely sinuate. E.

P. virgata Gr.

CC. Perennial; lower leaves pinnatifid. E.

P. tenuifolia Raf.

BB. Hairs of the pappus plumose only above the middle. E. (*S. lygodesmoides*.)

P. exigua Gr.

RAFINESQUIA

Annual; stem leafy, branched; ours glabrous thruout, 6—9 dm. high. Leaves pinnatifid, oblong (ours). Heads rather large, in panicles, 15—30-flowered; chief involucre-bracts 7—15, equal, linear, attenuate, with some smaller ones outside; receptacle naked. Corolla white or flesh-colored. Akene terete, somewhat fusiform, obscurely few-ribbed, attenuate into a slender beak, wide at base. Pappus of bristles, bristles capillary, 10—15, soft, long-plumose from the base to near the tip, dull-white (ours). Probably in honor of C. S. Rafinesque, an American botanist.) E.

R. californica Nutt.

TRAGOPOGON

SALSIFY

Biennial or perennial; stem erect, usually branched, somewhat succulent; tap-root slender, fleshy. Leaves linear-lanceolate, entire, long-acuminate, clasping at base. Heads long-peduncled, solitary and 5—10 cm. wide (ours); involucre-bracts in 1 series, nearly equal, acuminate, united at base, exceeding the rays (ours). Corolla purple (ours), opening mornings. Akenes linear or terete or 5-angled, 5—10-ribbed, terminated by slender beaks or the outermost beakless. Pappus-bristles in 1 series, plumose, connate at base; plume-branches interwebbed. (Gk. tragos=a goat, pogon=a beard; referring to the conspicuous tawny pappus. W. E.

T. porrifolius L. (Oyster Plant)

MALACOTHRIX

Annual (ours); stem leafy or scape-like. Leaves sometimes all basal. Heads long-peduncled, solitary or in panicles, usually nodding in bud, many-flowered; involucre-bracts imbricated or merely a few very short outer ones; receptacle naked or with delicate bristles. Corolla yellow (ours). Akenes not flattened, short-oblong or columnar, glabrous, terete and 5—15-ribbed or else 4—5-angled by the greater prominence of some of the ribs; apex wide, truncate, with sharp border or edge, entire or toothed. Pappus of bristles; bristles soft, scabrous or tending toward plumose near base, deciduous together; an outer row of mere short teeth, or with 2—8 bristles among the teeth. (Gk. malache=soft, thrix=hair; referring to the pappus.)

A. Pappus of 1 series of bristles, with an exterior border of minute teeth. E.

M. sonchoides T. & G.

AA. Pappus of 2 series of bristles, the outer bristles 2—8 with minute teeth between.

B. Lobes of the lower leaves linear to filiform; outer pappus-bristles 2. E.

M. glabrata Gray

BB. Lobes of the lower leaves short and wider than linear; outer pappus-bristles 2—8. E.

M. torreyi Gray

TARAXACUM

DANDELION

Perennial, acaulescent. Leaves basal, dentate to pinnatifid. Heads large, solitary (ours); inner involucre-bracts in 1 series, nearly equal, slightly united at base; outer of several series, shorter, somewhat spreading, often reflexed at maturity; receptacle naked. Corolla yellow. Akene oblong or linear-fusiform, 4—5-angled, 5—10-ribbed, roughened or spinulose at least above, tapering into a very slender beak. Pappus of bristles; bristles capillary, filiform, unequal, simple, persistent, many. (Gk. taraktikos=a cathartic; from its medicinal properties.) W. C. E. (*T. taraxacum*.)

T. officinale Webb.

SONCHUS

SOW-THISTLE

Annual or perennial; stem leafy. Leaves mostly auriculate-clasping, entire to pinnatifid, prickly-margined. Heads large or medium, in corymbs or panicles; involucre-bracts herbaceous or membranous, imbricated in several series, the outer smaller; receptacle naked. Corolla yellow. Akene oval or oblong or linear, somewhat flattened, 10—20-ribbed, somewhat narrowed at base, truncate. Pappus of bristles; bristles many, white, capillary, simple. (Gk. sonchos=hollow; referring to the stem.)

- A. Involucre glandular-pubescent, 25 mm. high; flowers bright-yellow; perennial; leaves with acute basal angles; akenes transversely wrinkled. W. E.
S. arvensis L. (Field Sow-thistle)
- AA. Involucre glabrous, 12—16 mm. high; flowers pale-yellow; annual.
- B. Leaves with acute basal angles; akenes transversely wrinkled. W.
S. oleraceus L. (Common Sow-thistle)
- BB. Leaves with rounded basal angles; akenes not transversely wrinkled. W. E.
S. asper Hill (Prickly Sow-thistle)

LACTUCA

LETTUCE

Stems tall, leafy. Heads in panicles, small; involucre-bracts imbricated in several series, the outer shorter; receptacle naked. Corolla yellow or blue or purple. Akenes oval or oblong or linear, flat, 3—5-ribbed on each face, narrowed above or contracted into a narrow beak; beaks sometimes expanded disk-like under pappus. Pappus of bristles; bristles capillary, soft, many, white or brown. (L. lac=milk; from the abundant milky juice.)

- A. Pappus brownish; flowers blue; plant 1—3.5 m. high; involucre 10—12 mm. long; leaves not prickly on the mid-veined beneath. W. C. E.
L. spicata Hitch.
- AA. Pappus white; flowers rarely blue, mostly yellow.
- B. Leaves not prickly on the mid-veins beneath.
- C. Flowers blue; perennial; involucre 16—20 mm. long; akene and its beak about 1/3 as long as the pappus. W. E.
L. pulchella DC. (Blue Lettuce)
- CC. Flowers yellow, rarely purplish; annual or biennial; involucre 8—14 mm. long; akene and its beak about as long as the pappus.
- D. Heads 12—20-flowered; akenes 1-veined on each face. W.
L. sativa L. (Garden Lettuce) z
- DD. Heads 6—12-flowered; akenes several-veined on each face; plant 1—4 m. high.
- E. Leaves strictly entire. E.
L. sagittifolia Ell.
- EE. Leaves except the upper ones sinuate-pinnatifid. E.
L. canadensis L. (Wild Lettuce)
- BB. Leaves prickly on the mid-veins beneath; flowers yellow; akene about equaling its beak.
- F. Leaves oblong-lanceolate, sinuate-pinnatifid. W. E.
L. scariola L. (Prickly Lettuce)
- FF. Leaves oblanceolate, merely irregularly denticulate. W. E.
L. scariola integrata G. & G.

LYGODESMIA

Perennial (ours), smooth; stems rigid or rusk-like; some of the branches sometimes reduced to spines. Leaves lanceolate or linear, or scale-like by reduction. Heads scattered or terminating the branches, 3—12-flowered; principal involucre-bracts 5—8, linear, scarious-margined, equal, with several very short ones outside; receptacle naked. Corolla pink or rose-colored. Akene terete, obscurely ribbed or veined, usually linear or slender-fusiform, sometimes attenuate but hardly beaked. Pappus of bristles; bristles soft or somewhat rigid, capillary simple, white to brownish, usually somewhat unequal. (Gk. lygos=a twig, desma=a bundle; referring to the tufted rush-like stems.)

- A. None of the branchlets pine-like; pappus light-brown; akene 8-ribbed. E.
 L. juncea Dow.
 AA. Some of the branchlets spine-like; pappus white; akene 4—5-ribbed. E. (*Spinosa lanata*.)
 L. spinosa Nutt.

AGOSERIS (Troximon)

GOAT CHICORY

Annual or perennial, acaulescent or nearly so. Leaves basal, entire to pinnatifid. Heads solitary on simple elongated scapes; involucre-bracts usually lanceolate, imbricated in few series, the outer loose and often somewhat foliaceous; receptacle flat, naked. Corolla yellow. Akene oblong or linear, terete, 10-ribbed or -ridged, apex contracted into a neck or prolonged into a beak. Pappus of bristles; bristles copious, white or whitish, capillary, merely scabrous. (Gk. aix=a goat, seris=chicory.)

- A. Akene beakless, 10-ridged to the pappus; alpine plant; leaves glabrous. C.
 A. alpestris Gr.
 AA. Akene beaked.
 B. Beak of the akene shorter than the body, stout, mostly ridged.
 C. Leaves glaucous, glabrous. C. E. (*A. glauca aspera*; *A. glauca scorzoneraefolia*.)
 A. glauca Gr.
 CC. Leaves not glaucous, glabrous or hairy.
 D. Plant tomentose up to the involucre. E.
 A. tomentosa How.
 DD. Plant not tomentose except sometimes near base.
 E. Leaves or some of them not entire.
 F. Leaves pubescent; leaf-lobes linear. E.
 A. arachnoidea Rydb.
 FF. Leaves glabrate; leaf-lobes not linear.
 A. barbellulata Gr.
 EE. Leaves all entire; plant glabrous or nearly so thruout.
 G. Involucre-bracts acuminate; beak of akene ridged. E.
 A. parviflora Gr.
 GG. Involucre-bracts acute or obtuse; beak of akene not ridged. C. E.
 A. aurantiaca Gr.
 BB. Beak of the akene as long or slightly longer than the body.
 H. Flowers orange; most of the leaves entire, narrowly linear, scape not tomentose near top. W. C. E. *A. gracilentia* Gr.
 HH. Flowers yellow; most of the leaves not entire; scape not tomentose near top.
 I. Akene together with its beak 8—10 mm. long; involucre tomentose. W. C. E.
 A. elata Gr.
 II. Akene together with its beak 12—15 mm. long; involucre pubescent. W.
 A. asparigoides Gr.
 HHH. Flowers deep saffron-colored; most of the leaves lobed or toothed; scapes tomentose near top. C. E.
 A. purpurea Gr.
 BBB. Beak of the akene slender, not ridged, 2 or more times as long as the body.
 J. Pappus almost as long as the beak of the akene. W.
 A. hirsuta Gr.
 JJ. Pappus much shorter than the beak of the akene.
 K. Perennial; heads 2—4 cm. high; beak of akene 10—25 mm. long.
 L. Apex of akene attenuate, its beak 10—18 mm. long.
 M. Heads 2 cm. high. W. E.
 A. laciniata Gr.

MM. Heads 2.5—3 cm. high. E. *A. grandiflora* Gr.

LL. Apex of akene abruptly contracted; beak 20—25 mm. long. U. E.
A. retrorsa Gr.

KK. Annual; heads 1—18 cm. high; beak of akene 6—8 mm. long. E. (*A. heterophylla* varieties.)
A. heterophylla Gr.

CREPIS

HAWK'S-BEARD

Annual or perennial, stems leafy or scape-like, simple or branched. Leaves sometimes all basal, entire to pinnatifid. Heads solitary or paniculate, few to many-flowered; principal involucre-bracts in 1 series, equal, with a number of smaller ones outside; receptacle naked or short-fringed. Corolla yellow. Akenes columnar to fusiform, 10—20-ribbed or -veined, not transversely rugose, narrowed at base and apex. Pappus bristles capillary, many, white, usually soft. (Gk. *krepis*=a sandal. Why?)

A. Leaves glabrous.

B. Plant with running rhizomes, glaucous; stems 2—5 cm. high; leaves entire or wavy; akenes with discoid dilation at the insertion of the pappus. W. C.

C. nana Rich.

BB. Plant without rhizomes, mostly not glaucous; stem 3—9 dm. high; leaves or some of them lacinate-pinnatifid, rarely entire; akenes not dilated at the insertion of the pappus.

C. Stem leafless or very nearly so.

D. Involucre ashy-pubescent, 12—18 mm. high. E.

C. andersoni Gray

DD. Involucre glandular-pubescent, 8—12 mm. high. E. (*C. platyphylla*.)

C. runcinata T. & G.

CC. Stem leafy; stem-leaves clasping. W.

C. virens L. (Smooth Hawksbeard)

AA. Leaves puberulent to tomentose.

E. Involucre glandular-hairy.

F. Leaves oblong to lanceolate in general outline.

G. Pubescence not of long brown glandular-hairs.

H. Stems scape-like, branched but with bract-like leaves, whole plant glandular. E. *C. runcinata hispidulosa* How.

HH. Stems not scape-like, branched and with unbract-like leaves, not glandular below. W. C. E. (Apparently *C. atrabarba*.)

C. occidentalis Nutt.

GG. Pubescence of long brown glandular hairs. U. E.

C. monticola Cov.

FF. Leaves spatulate to oblanceolate in general outline. E.

C. subcarnosa Gr.

EE. Involucre glabrous, of 5—8 principal bracts. E.

C. acuminata Nutt.

EEE. Involucre hairy but not glandular.

I. Involucre bracts without stiff bristles on the back.

J. Plant merely ashy-puberulent. E. (*C. gracilis*.)

C. intermedia Gray

JJ. Plant tomentose and sometimes also hirsute.

K. Plant without black hairs among the white ones.

L. Plant without stiff hairs among the woolly ones, 8—12 cm. high. E.

C. glareosa Pip.

LL. Plant with stiff hairs among the woolly ones, 10—40 cm. high. E.

C. rostrata Cov.

KK. Plants with black hairs among the white ones. E.

C. scorpulorum Cov.

II. Involucre bracts with stiff bristles on the back. E.

C. barbiger Leib.

NABALUS (Prenanthes) RATTLESNAKE-ROOT

Perennial. Leaves mostly petioled, dentate (ours), upper often narrower. Heads many, 5—15-flowered (ours), in spike-like terminal panicles, involucre cylindric, usually narrow; chief bracts 8—10 (ours) in 1—2 series, often with a few smaller ones outside; receptacle naked. Corolla purplish (ours). Akenes oblong or narrowly columnar, truncate or tapering, terete or 4—5-angled, mostly 10-ribbed. Pappus of bristles; bristles capillary, rigid, simple, white to reddish-brown, many. (The Latinized Indian name for the Rattlesnake-root.) W. C. (*N. alatus*.)

N. hastatus Hel.

HIERACIUM HAWKWEED

Perennial. Leaves sometimes all basal. Heads solitary or corymbose or paniculate, 5—40-flowered (ours); chief involucre-bracts narrow, equal or in several series of different lengths, often with a few very much smaller ones outside; receptacle naked or short-fringed. Corolla white or yellow. Akenes oblong or columnar, glabrous, smooth except for ridges, often 10-ridged or -ribbed, terete or 4—5-angled. Pappus of capillary bristles, scabrous, white to brown, usually fragile. (Gk. hierax—a hawk; it was supposed to better the vision of birds of prey.)

A. Flowers white; involucre not distinctly imbricated. W. C. E.

H. albiflorum Hook. (White Hawkweed)

AA. Flowers yellow.

B. Involucre of 2 or 3 series of bracts, the outer series are successively shorter.

C. Lower part of stem pilose; leaves usually nearly entire and narrowly lanceolate.

E. (*H. columbianum*.) *H. umbellatum* L.

CC. Lower part of stem glabrous; leaves usually acutely dentate and widely lanceolate or ovate-oblong. W. E.

H. canadense Michx.

BB. Involucre of 1 series of bracts with only a few much smaller bracts outside.

D. Involucre hoary with stellate hairs. U.

H. howellii Gray

DD. Involucre without stellate hairs.

E. Involucre 10—16 mm. high, with or without black hairs.

F. Involucre without black hairs.

G. Involucre with merely a few or no long hairs.

H. Stem ashy-hairy; heads 15—40-flowered; stem leafy.

I. Involucre more or less glandular, bracts not scarious-margined; plant with long white hairs. W. C. E. (*H. griseum*.)

H. scouleri griseum Nels.

II. Involucre not glandular, bracts widely scarious-margined; plant without long white hairs. W.

H. cinereum How.

HH. Heads 10—15-flowered; stem not leafy, glabrous or nearly so.

U. *H. bolanderi* Gray

GG. Involucre densely long-hairy.

- J. Involucre not glandular; stem-leaves ample, half-clasping at the wide base. W. C. *H. longiberbe* How.
- JJ. Involucre glandular; stem-leaves reduced to foliaceous bracts. E.
H. scouleri Hook.
- FF. Involucre with some stiff black-hairs.
- K. Leaves without stelate hairs beneath. W. C. E. (*H. amplum.*)
H. cynoglossoides AT.
- KK. Leaves with stellate hairs beneath. U.
H. barbigerum Gr.
- EE. Involucre 8 mm. high, black-hairy. C. E.
H. gracile Hook.

Glossary

- A- —Not, or without.
- Acaulescent—Apparently stemless, the leaf-bearing stem being very short or subterranean.
- Acicular—Needle-shaped.
- Acuminate—Taper-pointed.
- Acute—Merely sharp-pointed, or ending in a point less than a right angle.
- Adnate—Grown together.
- Akene—A small dry hard 1-celled 1-seeded indehiscent fruit.
- Alpine—Belonging to high mountains above the limit of forests.
- Alternate (leaves, branches)—Singly at the stem-nodes.
- Ament—Catkin—A deciduous scaly spike of flowers.
- Angiosperms—The great group of seed-plants with ovules (and seeds) inclosed by an ovary.
- Annual—Of only one year's duration.
- Anther—The part of the stamen which contains the pollen.
- Anthesis—The opening of the flower.
- Apetalous—Without petals.
- Apiculate—Tipped with a short and abrupt point.
- Appressed—Lying close and flat.
- Arborescent—Tree-like in size or form.
- Arcuate—Bent or curved like a bow.
- Aril—An appendage growing at or about the hilum of a seed.
- Aristate—Awned.
- Articulate—Jointed.
- Ascending—Rising gradually upward.
- Auriculate—With ear-like appendages.
- Awl-shaped—Sharp-pointed from a broader base.
- Awn—A bristle-like appendage.
- Awned—With an awn.
- Axil—The upper angle between a leaf and the stem.
- Axillary—Occurring in an axil.
- Axis—The central line of any body; the organ around which others are attached.
- Barbed—With usually reflexed rigid points or short bristles like the barb of a fish-hook.
- Barbellate—Finely barbed.
- Basifixed—Attached by the base.
- Beaked—Ending in a long narrow tip.
- Bearded—With long or stiff hairs of any sort; awns of grasses are sometimes called beards.
- Berry—A fruit pulpy or juicy throughout, as a currant or a grape.
- Bi- —Two or twice.
- Bidentate—2-toothed.
- Biennial—Growing from seed one year, then blooming and dying the next.
- Bifid—2-cleft to about the middle.
- Bilabiate=labiate—2-lipped.
- Bipinnate=2-pinnate—Pinnate, then each part again pinnate.
- Bipinnatifid=2-pinnatifid—Pinnatifid and then the parts again pinnatifid.
- Biternate=2-ternate—With 3 main divisions each with 3 leaflets.
- Bladdery—Thin and inflated.
- Bract—A very much reduced leaf, specially one subtending a pedicel.
- Bractlet—A bract on the pedicel.
- Bristle—A stiff sharp hair or any very slender body of similar appearance.
- Bulb—A leaf-bud with fleshy scales, usually subterranean.
- Bulbiferous—Producing bulbs.
- Bulblet—A small bulb.
- Bulbous—Bulb-like in form.
- Caducous—Dropping off very early as compared with other parts.
- Caespitose—Growing in tufts.
- Callus—A hard protuberance; in grasses the tough swelling at the base of the lemma.
- Calyx—The outer set of floral envelopes; when there is but 1 it is considered to be calyx.
- Campanulate—Bell-shaped.
- Canescent—Grayish-white with fine hairs.
- Capillary—Hair-like in form.
- Capitate—Collected into a head-like cluster.
- Capsule—A pod; any dry dehiscent seed-vessel.
- Carinate—Keeled; furnished with a sharp ridge or projection on the lower side.

- Carpel—The pistil is composed of 1 or more modified leaves each of which is a carpel.
 Catkin=Ament.
 Caudate—Tailed.
 Caudex—The persistent base of an otherwise annual herbaceous stem.
 Cauliscent—Having an obvious leafy stem.
 Cauline—Belonging to a stem.
 Cernuous—Nodding.
 Chaff—Small scales or bracts on the receptacle of Compositaceae; the glumes of grasses, etc.
 Chaffy—Furnished with chaff, or of the texture of chaff.
 Chartaceous—With the texture of paper or parchment.
 Ciliate—The edge with a fringe of hairs.
 Cinereous—The color of ashes.
 Circinate—Rolled inward from the end, like some umbrella-handles.
 Circumscissile—Opening by a transverse circular line of division.
 Clavate—Shaped like a base-ball bat.
 Claw—The narrow or stalk-like base of some petals.
 Club-shaped=Clavate.
 Coalescence—The union of parts or organs of the same kind.
 Cohesion—The union of one organ with another of like nature.
 Column—The united stamens, as in Malvaceae; or the stamens and pistils united into one body, as in Orchidaceae.
 Commissure—The plane of union of the two carpels in the Umbellaceae.
 Compound—A pistil composed of 2 or more carpels; a leaf divided into leaflets.
 Compressed—Flattened on two opposite sides.
 Congested—Crowded together.
 Connate—United or grown together from the first.
 Connective—The part of the anther connecting its two cells.
 Connivent—Converging, or brought close together.
 Contorted—Twisted together.
 Convoluted—Rolled up lengthwise.
 Cordate—Heart-shaped, with the notch basal.
 Coriaceous—Leathery in texture.
 Corm—A solid bulb.
 Corolla—The flowery envelope (usually showy) within the calyx.
 Corona=Crown.
 Corymb—A flat or convex flower-cluster, with branches arising at different levels and blooming from the outside toward the center.
 Corymbose—Corymb-like.
 Costate—Ribbed.
 Cotyledons—The first leaves of the embryo.
 Creeping (stems)—Growing flat on or beneath the ground and rooting.
 Crenate—With rounded teeth.
 Crown=Corona—An appendage at the top of the claw of some petals.
 Crustaceous—Hard and brittle in texture; crust-like.
 Cucullate—Hooded or hood-shaped.
 Cuneate=Cuneiform—Wedge-shaped.
 Cupule—A little cup; the cup of the acorn.
 Cuspidate—Tipped with a sharp and stiff point.
 Cymbiform—Boat-shaped.
 Cyme—Like a corymb, but blooming from the center outward.
 Cymose—Cyme-like.
 Deciduous—Applied to leaves which fall in autumn, and to a calyx and corolla which falls before fruit forms.
 Decomposed—Several times compounded.
 Decumbent—Reclined on the ground, but the summit tending to rise.
 Decurrent (leaves)—With blade-like extensions on the stem beneath the insertion, as in thistles.
 Decussate—In pairs which are successively alternate with each other.
 Deflexed—Bent downwards.
 Dehiscence—The natural opening of an anther or pod or other vessel.
 Dehiscent—Opening naturally.
 Deltoid—Shaped like the Greek letter Δ .
 Dentate—Toothed.
 Denticulate—Diminutive of dentate.
 Depauperate—Below the natural size.
 Depressed—Flattened, or as if pressed down from above.

- Di—Two, or twice.
 Diadelphous (stamens)—United by the filaments into two sets.
 Dichotomous—2-forked.
 Dicotyledonous—Having 2 cotyledons.
 Dicotyledons—Plants which have 2 cotyledons.
 Didymous—Twin.
 Didynamous—With 2 stamens longer than the others.
 Diffuse—Spreading widely and irregularly.
 Digitate—Leaflets all borne on the apex of the petiole.
 Dimorphous—Of 2 forms.
 Dioicous=Dioecious—With stamens and pistils in separate flowers on different plants.
 Disk—The central region of a head of flowers, like the sunflower, as opposed to the ray or margin; a fleshy expansion of the receptacle of a flower.
 Dissected—Cut deeply into many lobes or divisions.
 Distichous—Two-ranked.
 Divaricate—Very widely divergent.
 Divided (leaves, etc.)—Cut into divisions extending about to the base or the midrib.
 Dorsal—Pertaining to the back or outer surface of an organ.
 Drupaceous—Drupe-like.
 Drupe—A stone-fruit.
 Drupelet—Diminutive of drupe.
 Echinate—Armed with prickles.
 Elliptic=Elliptical—Oval or oblong with the ends regularly rounded.
 Emarginate—Shallowly notched at the summit.
 Emerged—Raised out of water.
 Ensiform—Sword-shaped.
 Entire (foliar organs)—The margin not at all toothed, notched or divided.
 Ephemeral—Lasting for a day or less.
 Epigynous—Upon the ovary.
 Equitant—Leaves which infold each other in two ranks, as in Iris.
 Erode—As if gnawed.
 Evergreen—Holding the leaves over winter or longer until new ones appear.
 Excurrent—Projecting beyond the apex; or a tree trunk continued to the very top.
 Exserted—Protruding out of, as the stamens out of the corolla.
 Extrorse—Turned outward.
 Fascicle—A close cluster.
 Fascicled—Growing in a bundle or tuft.
 Fastigate (branches)—Close, parallel.
 Favose—Honeycombed.
 Fertile—Fruit-bearing; or pollen-bearing anthers.
 Filament—The stalk of a stamen; any slender thread-shaped appendage.
 Filiform—Thread-shaped.
 Fimbriate—Fringed.
 Flabelliform—Fan-shaped.
 Floccose—Composed of or bearing tufts of woolly or long and soft hairs.
 Foliaceous—Leaf-like.
 Follicle—A simple pod, opening down the inner suture.
 Foveate—Deeply pitted.
 Foveolate—Diminutive of foveate.
 Free—Not united with any other parts.
 Fringed—The margin beset with slender appendages, bristles, etc.
 Fruit—The seed-bearing structure of a plant.
 Fugacious—Soon falling off or perishing.
 Fulvous—Tawny; dull yellow with gray.
 Fusiform=Spindle-shaped.
 Galea—A hooded or helmet-shaped portion of some perianths.
 Gamopetalous=Monopetalous—Sympetalous; petals united into 1 piece.
 Geminate—In pairs.
 Geniculate—Bent abruptly, like a knee.
 Gibbous—More swollen at one place or on one side than the other.
 Glabrate—Becoming glabrous with age, or almost glabrous.
 Glabrous—Smooth, having no hairs, bristles, or other pubescence.
 Gland—A secreting surface or structure; any protuberance or appendage having the appearance of such an organ.
 Glaucous—Covered with a fine white powder that rubs off, like that on a fresh plum.
 Globose—Spherical or nearly so.
 Glochidiate (hairs or bristles)—Barbed; tipped with barbs, or with a double hooked point.

- Glomerate—Closely aggregated into a dense cluster.
 Glomerule—A dense head-like cluster.
 Glume—The chaff of grasses, in this book the outer husks or bracts of each spikelet.
 Gymnosperms—The great group of seed-plants with ovules and seeds not inclosed in an ovary.
 Gynobase—An enlargement or prolongation of the receptacle bearing the ovary.
 Gynoecium—The whole set of pistils.
 Habitat—Conditions under which a plant grows.
 Hastate—Like an arrowhead, but with the basal lobes pointing outward nearly at right angles.
 Hemi—Half.
 Herb—A plant with no persistent woody stem above ground.
 Herbaceous—With the texture of common herbage; not woody nor leathery.
 Hermaphrodite (flower)=Perfect.
 Heterogamous—With 2 or more kinds of flowers as to their stamens and pistils.
 Hirsute—Hairy with stiffish or beard-like hairs.
 Hispid—Bristly; beset with stiff hairs.
 Hispidulous—Diminutive of hispid.
 Hoary—Grayish-white.
 Homogamous—A head or cluster with flowers all of one kind.
 Hooded=Hood-shaped=Cucullate.
 Hyaline—Transparent or nearly so.
 Hypogynous—Inserted under the pistil.
 Imbricate—Overlapping like shingles on a roof.
 Immersed—Wholly under water.
 Imperfect (flowers)—Wanting either stamens or pistils.
 Incised—Cut rather deeply and irregularly.
 Indehiscent—Not splitting open.
 Indurated—Hardened.
 Inferior (ovary)—Calyx grown fast to the ovary and thus apparently on it.
 Inflated—Turgid and bladdery.
 Inflexed—Bent inward.
 Inflorescence—The arrangement of flowers on the stem; the flower-cluster as a whole.
 Insertion—The place or the mode of attachment of an organ to its support.
 Internode—The part of a stem between two nodes.
 Interruptedly pinnate—Pinnate with small leaflets intermixed with larger ones.
 Introrse—Turned or facing inward or toward the axis of the flower.
 Involucre—An involucre of the second order.
 Involucrate—With an involucre.
 Involucre—A whorl or set of bracts around a flower or umbel or head.
 Involute—Rolled inward from the edges.
 Keel—A projecting ridge on a surface, like the keel of a boat; the two anterior petals in the Bean Family.
 Labiate=Bilabiate.
 Laciniate—Slashed; cut into deep narrow lobes.
 Lanceolate—Lance-shaped.
 Lax—The opposite of crowded.
 Leaflet—One of the divisions or blades of a compound leaf.
 Lemma—The lower of the two bracts inclosing the flower in the grasses.
 Lenticular—Lens-shaped, both sides convex.
 Ligulate—Furnished with a ligule.
 Ligule—The strap-shaped corolla in many Compositaceae; the little membranous appendage at the summit of the leaf-sheaths of most grasses.
 Limb—The blade of a leaf, petal, etc.
 Linear—Narrow and flat, the margins parallel.
 Lip—The principal lobes of a 2-lipped corolla or calyx; the odd and peculiar petal in the Orchidaceae.
 Lobe—Any projection or division (especially a rounded one) of a leaf, etc.
 Loculicidal (dehiscence)—Splitting down through the middle of the back of each cell.
 Lunate—Crescent-shaped.
 Lyrate—Lyre-shaped; an obovate or spatulate pinnatifid leaf with the end-lobe large and roundish and the lower lobes small.
 Marcescent—Withering without falling off.

- Membranous—With the texture of a membrane; thin and more or less translucent.
- Mid-rib=Mid-vein—The middle or main rib of a leaf.
- Monadelphous—Stamens united by their filaments into one set.
- Monocotyledonous (embryo) — Having only one cotyledon.
- Monocotyledons—The great group of plants having only 1 cotyledon.
- Monoicous=Monoecious—With stamens and pistils in separate flowers on the same plant.
- Monopetalous (flower)=Gamopetalous—With united petals.
- Mucronate—Tipped with an abrupt short point.
- Mucronulate—Diminutive of mucronate.
- Multi- —Many.
- Nectariferous—Nectar-bearing.
- Nerve=Vein—A name for the ribs or veins of foliar organs, especially when simple and parallel.
- Node—The joints of a stem, from which the leaves arise.
- Nodose—Knotty or knobby.
- Nut—A hard and mostly one-seeded indehiscent fruit, as a chestnut, butternut, acorn.
- Nutlet—Diminutive of nut.
- Ob- —Upside down.
- Obcompressed—Flattened the opposite of the usual way.
- Obcordate—Heart-shaped with small end basal.
- Oblanceolate—Lance-shaped with the tapering point basal.
- Oblong—Two to three times as long as wide, and more or less elliptic.
- Obovate—Inversely ovate, the broad end up.
- Obtuse—Blunt or round at the end.
- Ochroleucous — Yellowish - white; dull cream-color.
- Ocrea—A sheathing stipule.
- Odd-pinnate—Pinnate with an uneven number of leaflets.
- Offset—Short branch next the ground which takes root.
- Opposite—Applied to leaves and branches when an opposing pair occurs at each node; to stamens when directly in front of the petals.
- Orbicular—Circular or nearly so in general outline.
- Oval—Broadly elliptical.
- Ovate—Shaped like the section of an egg with the broader end basal.
- Ovoid—A solid with an ovate section.
- Ovule—The body which becomes a seed after fertilization.
- Palate—A projection on the lower lip of a 2-lipped corolla closing the throat.
- Palet—The inner husk of grasses; the chaff or bracts on the receptacle of many Compositaceae.
- Palmate—Applied to a leaf whose leaflets or divisions or main ribs all spread from the apex of the petiole, like a hand with outspread fingers.
- Palmately lobed, cleft, parted, divided, etc.—The varying depths of division of a palmate leaf.
- Panicle (inflorescence)—An open cluster like a raceme, but more or less compound.
- Panicked=Paniculate—In panicles, or panicle-like.
- Papilionaceous—Butterfly - shaped; applied to such a corolla as that of the pea.
- Papilla (papillae)—A little nipple-shaped protuberance.
- Papillose—Covered with papillae.
- Pappus—The modified calyx-limb in Compositaceae, forming a crown of very various character at the summit of the akene.
- Parietal=Lateral—Attached to the walls, as of the ovary.
- Parted—Separated or cleft into parts almost to base.
- Pectinate—Pinnatifid or pinnately divided into narrow and close divisions, like the teeth of a comb.
- Pedicel—The stalk of each particular flower of a cluster.
- Pediceled—With a pedicel.
- Peduncle—A flower-stalk, whether of a single flower or of a flower-cluster.
- Peduncled—With a peduncle.
- Peltate—Shield-shaped; applied to a leaf, whatever its shape, when the petiole arises from the under surface.

- Pendulous—Somewhat hanging or drooping.
- Penta- —5.
- Perennial—Lasting from year to year.
- Perfect (flower)—Having both stamens and pistils.
- Perfoliate—Applied to a leaf through whose base the stem appears to pass.
- Perianth—The floral envelopes of the flower, especially when calyx and corolla cannot be distinguished.
- Pericarp—The wall of the ripened ovary, which in many cases is the wall of the fruit.
- Perigynium—The inflated sac which incloses the ovary in *Carex*.
- Perigynous (flower)—Sepals and petals and stamens arising from the rim of a tube or cup surrounding the pistil or pistils.
- Persistent—Remaining beyond the period when such parts commonly fall.
- Petal—A corolla-leaf.
- Petiole—The leaf-stalk.
- Petioled=Petiolate—With a petiole.
- Petiolulate—With a petiolule.
- Petiolule—The stalk of a leaflet.
- Pilose—Hairy with soft slender hairs.
- Pinnate (leaf)—Leaflets along the main axis of the leaf.
- 2-pinnate=Bipinnate.
- Pinnately veined—Secondary veins arising from a mid-vein.
- Pinnately lobed, cleft, parted, divided, etc.—The varying depths of division of a pinnately-veined leaf.
- Pinnatifid—Pinnately cleft.
- 2-pinnatifid=Bipinnatifid.
- Pistil—The seed-bearing organ of the flower.
- Pitted—Having small depressions or pits on the surface.
- Placenta—The surface of the ovary to which the ovules are attached.
- Plicate—Folded lengthwise into plaits.
- Plumose—Feathery; when any slender body is beset with hairs.
- Pluri- —Several, or many.
- Pod—Any sort of capsule.
- Poly- —Many.
- Polygamous—Having some perfect and some staminate and pistillate flowers on the same or on different individuals.
- Polymorphous—Of several forms.
- Polypetalous—With the petals distinct.
- Polysepalous—When the sepals are distinct.
- Pome—A fleshy apple-like fruit, e. g., apple, pear, haw.
- Procumbent—Trailing on the ground.
- Produced—Extended or projecting farther than usual.
- Proliferous—A new branch arising from an older one, or one head or cluster of flowers from another.
- Prostrate—Lying flat on the ground.
- Pruinose—Covered with a powder resembling hoar-frost.
- Puberulent—Covered with almost imperceptible fine and short down.
- Pubescence—Fine and soft hairs.
- Pubescent—With pubescence.
- Punctate—Dotted, either with minute holes or apparently so.
- Raceme—A flower-cluster with one-flowered pedicels along the axis of inflorescence.
- Racemose—Bearing racemes; or raceme-like.
- Rachis—An axis bearing close-set organs; specially the axis of a spike.
- Radiate—Furnished with ray-flowers.
- Radical—Belonging to the root, or apparently coming from the root.
- Ray—The marginal flower of a head or cluster when different from the rest, especially when ligulate; the branch of an umbel.
- Receptacle—The more or less expanded or produced end of an axis which bears the organs of a flower or the collected flowers of a head.
- Recurved—Curved outward or backward.
- Reflexed—Bent outward or backward.
- Regular (flower)—All the parts of each set similar.
- Reniform—Kidney-shaped.
- Repand—Wavy-margined.
- Retuse—The apex slightly indented.
- Revolute—Rolled backward, as the margins of many leaves.
- Rhizome=Rootstock—A subterranean or creeping root-like stem.
- Ringent—Gaping.
- Rootstock=Rhizome.

- Rosulate (leaves)**—In a rosette, or basal whorl.
- Rotate**—Wheel-shaped.
- Rudimentary**—Imperfectly developed, or in an early stage of development.
- Rugose**—Wrinkled, roughened with wrinkles.
- Runcinate**—Coarsely saw-toothed or cut, the pointed teeth turned toward the base of the leaf, as in dandelions.
- Runner**—A slender and prostrate branch rooting at the end or at the joints.
- Sac=Sack**—Any closed membrane, or a deep purse-shaped cavity.
- Sagittate**—Arrow-head-shaped.
- Salver-shaped=Salverform**—With a border spreading at right angles to a slender tube.
- Samara**—A wing-fruit, e. g., maple, ash, elm.
- Scabrous**—Rough or harsh to the touch.
- Scarious**—Thin, dry, membranous, and not green.
- Scale**—A reduced leaf-like body which is not green.
- Scape**—A peduncle rising from the ground, naked or without ordinary foliage.
- Scapose**—Scape-like; or with a scape.
- Scorpioid**—Curved or circinate at the end.
- Scurf**—Minute scales on the surface of many leaves.
- Scutellate**—Saucer-shaped.
- Secund**—One-sided, as where flowers, leaves, etc., are all turned to one side.
- Semi-**—Half.
- Sepal**—One of the leaves of which the calyx is composed.
- Septate**—Divided by partitions.
- Septum (septa)**—A partition, as of a pod, etc.
- Sericeous**—Clothed with satiny pubescence.
- Serrate**—With margin cut into teeth pointing forward.
- Serrulate**—Diminutive of serrate.
- Sessile**—Without any stalk or petiole.
- Sheath**—A tubular envelope, as the lower part of the leaf in grasses.
- Shrub**—A woody perennial, smaller than a tree, usually with several stems.
- Silique**—The pod of the Cruciferae.
- Silky**—Glossy with a coat of fine and soft, close-pressed, straight hairs.
- Silvery**—Shining white or bluish-gray, usually from a silky pubescence.
- Simple**—Of one piece; the opposite of compound.
- Sinuate**—Strongly wavy.
- Sinus**—The cleft or depression between two lobes.
- Spadix**—A fleshy spike.
- Spathe**—A bract which sheaths an inflorescence, specially a spadix.
- Spatulate**—Shaped like a spatula, or druggist's spoon.
- Spicate**—Spike-like; in a spike.
- Spike (inflorescence)**—The flowers sessile on an elongated axis.
- Spikelet**—A small or a secondary spike.
- Spindle-shaped**—Tapering at both ends like a sweet-potato.
- Spine**—A sharp woody or rigid outgrowth.
- Spinescent**—Tipped by or degenerating into spines or thorns.
- Spinose**—Thorny.
- Spur**—Any projecting appendage of the flower.
- Squarrose**—Said of scales, leaves, etc., when they spread widely from the axis on which they are thickly set.
- Stamen**—The pollen-bearing organ.
- Staminodium (staminodia)**—Abortive stamens or other bodies in the position of stamens.
- Standard**—The upper petal of a papilionaceous corolla.
- Stellate**—Star-like; several similar parts radiating from a common center.
- Sterile**—Barren or imperfect.
- Stigma**—The region of the pistil which receives the pollen.
- Stipe**—The stalk-like support of a pistil.
- Stipitate**—Furnished with a stipe.
- Stipules**—The appendages on each side of the base of some leaf-petioles.
- Stolon**—Trailing or reclined and rooting shoots.
- Stoloniferous**—Producing stolons.
- Strap-shaped**—Long, flat, and narrow.

- Striate—Marked with slender longitudinal grooves or channels.
 Strict—Close and narrow; straight and narrow.
 Strigose—Beset with appressed, rigid bristles or hairs.
 Strobilus=Strobile=Cone—A cone-like or head-like fruit, as in hop and pine.
 Strophiole=Caruncle.
 Style—The beak-like prolongation of the pistil above the ovary, which bears the stigma.
 Stylopodium—An enlargement at the base of the style, found in Umbellaceae and some other plants.
 Sub- —About, nearly, somewhat.
 Subulate—Awl-shaped.
 Succulent—Juicy or pulpy.
 Sucker—A shoot from subterranean branches.
 Suffrutescent—Slightly shrubby or woody at the base only.
 Superior (ovary)—The ovary free from the calyx to its base.
 Suture—The line of junction of contiguous parts that seem to have grown together.
 Sympetalous—With united petals.
 Syngenesious—With stamens united by their anthers.
 Tap-root—A stout vertical root which continues the main axis of the plant.
 Tawny—Dull yellowish with a tinge of brown.
 Tendril—A thread-shaped process used for climbing.
 Terete—Circular in cross section.
 Ternate—In 3's.
 2-ternate=Bitermate.
 Tetra- —4.
 Tetradynamous—With four stamens longer than the other two.
 Thorn=Spine.
 Throat—The orifice of a gamopetalous corolla or calyx; the region between the tube proper and the limb.
 Thyrsus—A compact and pyramidal panicle.
 Tomentose—Clothed with matted woolly hairs.
 Tomentum—Matted woolly hairs.
 Toothed—Furnished with teeth or short projections of any sort on the margin; used especially when these are sharp, like saw-teeth, and do not point forward.
 Torulose—Knobby; where a cylindrical body is swollen at intervals.
 Tri- —3.
 Trifid—3-cleft.
 Trigonous—3-angled.
 Triquetrous—Sharply 3-angled; and specially with the sides concave.
 Truncate—Ending abruptly, as if cut off transversely.
 Tuber—A thickened portion of a subterranean stem or branch.
 Tubercle—A small excrescence.
 Tunicate—Invested with layers as an onion.
 Turbinate—Top-shaped.
 Turgid—Swollen; thick as if swollen.
 Twining—Ascending by soiling round a support, like the hop.
 Umbel—The umbrella-like form of inflorescence.
 Umbellate—In umbels.
 Umbellet—A secondary or partial umbel.
 Unarmed—Destitute of spines, prickles, and the like.
 Uncinate—Hook-shaped; hooked at the end.
 Undulate—Wavy or wavy-margined.
 Unequally pinnate=Odd-pinnate.
 Unguiculate—With a claw or narrow base.
 Uni- —1.
 Unisexual—Having only one kind of sex-organs; applied also to flowers having only stamens or pistils.
 Urceolate—Urn-shaped.
 Utricle—A small thin-walled one-seeded fruit.
 Valvate—Opening by valves; in the bud, meeting by the edges without overlapping.
 Valve—One of the pieces into which a dehiscent pod or any similar body splits.
 Veins—The fibrovascular strands in a leaf or other organ.
 Venation—The veining of leaves, etc.

Ventral—Belonging to the anterior or inner face of an organ; the opposite of dorsal.

Versatile (anther)—Attached near the middle and turning freely on its support.

Verticillate=Whorled.

Vesicle—A little bladder.

Villous—Shaggy with long and soft hairs.

Vine—Any trailing or climbing stem.

Virgate—Wand - shaped, as a long straight slender twig.

Viscid—Glutinous, sticky.

Wedge-shaped—Broad above and tapering by straight lines to a narrow base.

Whorl—A circle of leaves or other organs at a node.

Wing—Any membranous expansion.

Woolly—Clothed with long and tangled soft hairs.

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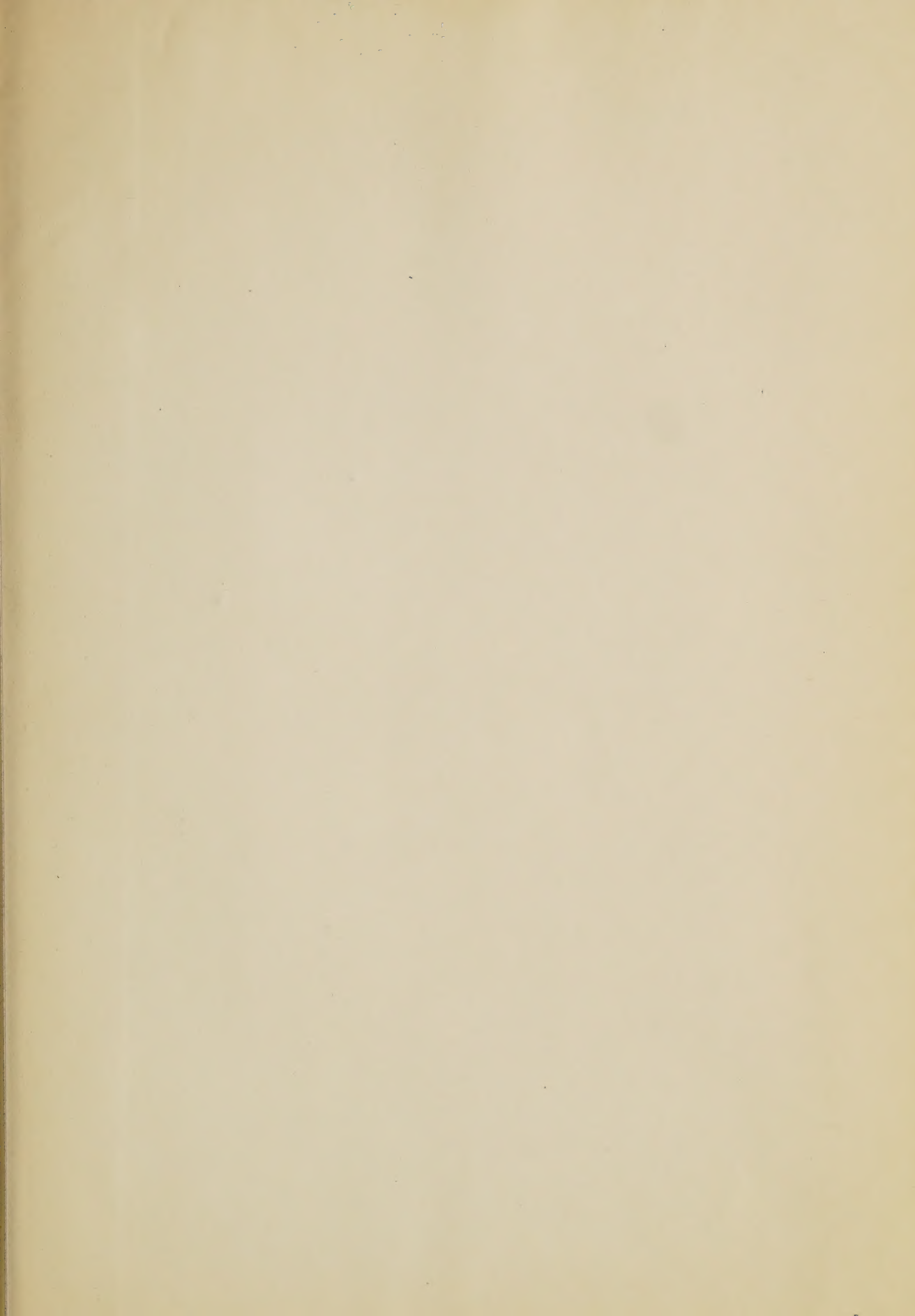
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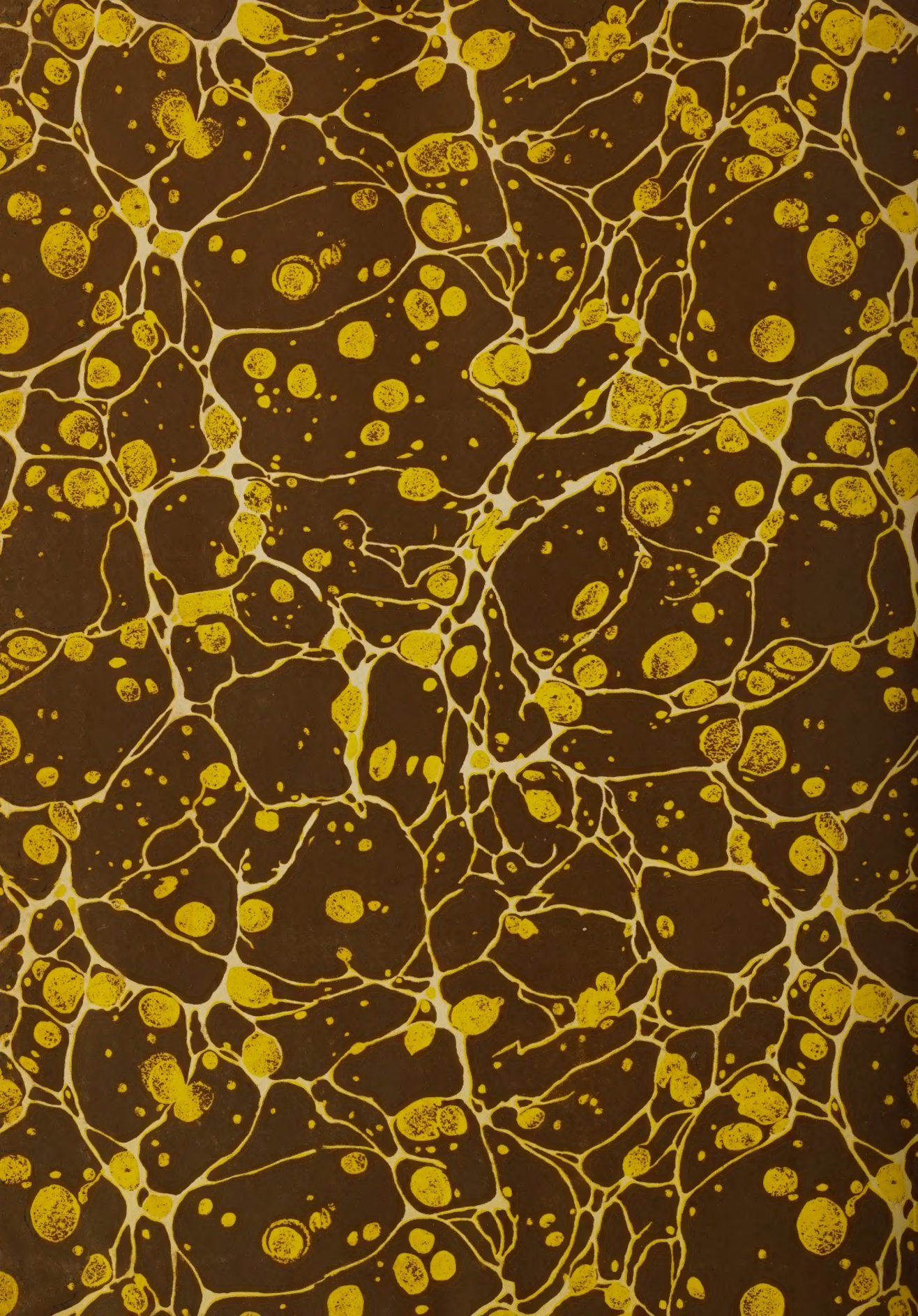
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